ENVIRONMENTAL ASSESSMENT OF CRUISE MISSILE TEST OPERATIONS AT THE UTAH TEST AND TRAINING RANGE

FINAL REPORT

Prepared for:

Ogden Air Logistics Center
Environmental Management
Plans and Programs
OOALC/EM/EMP
Hill Air Force Base, UT 84056

By:

Booz·Allen & Hamilton, Inc.
8283 Greensboro Drive
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7485 Quartz Street
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under contract
GS-23F-9755H

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FINDING OF NO SIGNIFICANT IMPACT

CRUISE MISSILE TEST OPERATIONS AT THE UTTR

The United States Air Force has prepared an Environmental Assessment (EA) addressing the ongoing and potential future environmental consequences of cruise missile test operations at the Utah Test and Training Range (UTTR). The Assessment addresses current and projected cruise missile testing at the range, at the current and at potential higher and lower levels of activity.

Description of Proposed Action and Alternatives

The Assessment addressed the potential impacts of the proposed action, and of four alternatives to the action. The Assessment analyses a variety of scenarios, including continuation of operations at the current level (the Proposed Action as well as the No Action Alternative), an increase in operations of approximately 80 percent (Alternative 1) and an equivalent percentage decrease (Alternative 2). The **proposed action** as analyzed consists of conducting six to eight cruise missile tests per year at the UTTR.

Alternative 1 consists of increasing the number of tests to ten to twelve per year. Each individual test would be conducted as individual tests are currently conducted.

Alternative 2 consists of decreasing the number of tests to two to three per year. Each individual test would be conducted as individual tests are currently conducted.

Alternative 3 would relocate the tests to another DoD test facility.

Alternative 4 would discontinue the tests.

The proposed action and each alternative were evaluated for the following factors:

1. **Operational benefit and necessity** – the degree to which this action satisfies an operational need
2. **Cost** – comparative costs for pursuing each of these alternatives
3. **Overall environmental impact** – impact at UTTR and elsewhere as a result of implementing this action or alternative
4. **Operational impact** – impact at UTTR and elsewhere as a result of implementing this action or alternative (how much CM testing impacts other programs)
5. **Efficiency of operations** – whether this is the most effective way to conduct the testing.

Based on these factors, the current level of operations and an increased level of activity were essentially equivalent in operational benefit. Reducing the number of tests lessened the benefits while continuing to impose some fixed infrastructure and personnel costs. Relocating the tests carried the operational penalties of interfering and co-existing with existing operations at some other DoD range facility, and the loss of benefits now being obtained by testing at UTTR, the best equipped and most capable facility for this mission.

Affected Environment

Cruise missile test activities normally take place on and over the South Range of the UTTR (that portion of the range south of Interstate Highway 80). The UTTR lies west of Salt Lake City, adjacent to and in some cases overlying the Nevada-Utah state line. Its airspace extends about 209 nautical miles north to south and about 88 nautical miles east to west. The elevation of the valley floors and salt flats is about 4200 feet above sea level, while the highest mountains reach slightly over 12,000 feet. Ground beneath the airspace is controlled in part by the Department of Defense (approximately 1.7 million acres of generally flat desert floor, or about 16% of the total land underlying the range airspace), by other government agencies, primarily the Bureau of Land Management, and by the State of Utah. Small holdings are in private hands.

The area is characterized by an arid climate, flat terrain interrupted by north-south mountain ranges, and few sources of fresh water. As a result, desert plant and animal species predominate. Some larger mammals are found, generally at higher elevations (pronghorns and wild horses). The land beneath the UTTR is not uninhabited; approximately 2000 persons live in small communities, generally on the west side of the major DoD land parcels. Farming and ranching economies predominate. Cultural resources tend to be more plentiful in mountain areas and caves; the salt flats do not now, nor is it likely that they ever supported permanent human habitation sites.

Summary of Environmental Consequences

The proposed action is not expected to result in significant impacts to the natural or human environment. Potential impacts ensue from the minor noise associated with overflights from missiles and chase aircraft, the physical impacts associated with the missiles' ground impacts at the target site, and any impacts associated with unplanned ground impacts in case of a mishap.

Cumulative Impacts

The CM test program does not impose cumulative impacts *per se*. Rather, other UTTR activity is deferred or relocated to accommodate the high priority but relatively low impact CM tests.

Conclusion

The EA was prepared pursuant to Council on Environmental Quality Regulations (40 USC 1500-1508) for implementing the procedural requirements of the National Environmental Policy Act (NEPA). The finding of the EA is that the proposed action will have no significant impact on the human or natural environment in the area under consideration, and therefore an Environmental Impact Statement (EIS) need not be prepared.

APPROVED: ______________________________ **DATE: ________________**
Environmental Protection Committee Chairman

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ENVIRONMENTAL ASSESSMENT OF CRUISE MISSILE TEST OPERATIONS AT THE UTTR

PURPOSE AND NEED

This Environmental Assessment (EA) addresses continuing cruise missile test activity at the Utah Test and Training Range (UTTR). The UTTR has been a test and training facility for nearly sixty years. Its current use is primarily for training and test by the Air Force and to a lesser extent by other Services, although both the Army and the Air Force also conduct significant activities involving non-aviation systems on the range. It is the nation's premier site for testing of large-footprint conventional weapons, especially cruise missiles (CMs).

UTTR LOCATION

The UTTR is located west of Salt Lake City, Utah. It consists of airspace that generally extends from State Highway 21 on the south to the Idaho state line and from the Great Salt Lake west to just beyond the Nevada/Utah state line, as well as three parcels of DoD ground. UTTR is divided internally by a land and airspace parcel referred to as the "Bonneville Corridor", which extends from the southwest corner of the Great Salt Lake to the Utah-Nevada border, generally overlying Interstate Highway 80. Access to Bonneville Corridor airspace and land is not controlled by the DoD, therefore the corridor effectively splits the range. Areas north of this corridor are called the North Range; those south of the corridor are referred to as the South Range. Each parcel includes airspace and DoD lands. For the purposes of this assessment, a "Cruise Missile Study Area" (CMSA) is defined, consisting of all of the UTTR airspace and ground underlying that airspace. The CMSA is defined for the purpose of reference in this assessment only, and has no official, legal or regulatory standing.

CM TEST ACTIVITY

The UTTR currently supports six to eight CM test operations per year, with the AGM-86b Air Launched Cruise Missile, the AGM-86c conventional ALCM and the AGM-129 Advanced Cruise Missile being tested. Each requires substantial advance planning and coordination. In particular, the high priority placed on this weapon system evaluation program displaces virtually every other user of the affected UTTR ranges and airspace.[1]

IDENTIFICATION AND ANALYSIS OF ALTERNATIVES

This assessment establishes the current level of CM test activity as the Proposed and No Action Alternatives. This reflects the host unit's perception that CM test activity at the UTTR will remain relatively constant over the foreseeable future, because the CM has become a very highly regarded weapon in current military operations. While strategic (nuclear-capable) CMs

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[1] *CM tests use the entire UTTR South Range; other activity may be conducted simultaneously on the North Range.*

continue to support the nation's deterrent forces, the conventional AGM-86C has been employed by the US Air Force in a variety of localized military engagements.

DEFINITION OF ALTERNATIVES

Alternatives were proposed to identify possible other test activity levels. A high level was identified at ten to twelve events per year. A lower level would involve two to three events per year. Other alternatives would relocate CM tests to another Major Range Test Facility Base (MRTFB) location or eliminate the tests completely.

RECOMMENDED ALTERNATIVE

Because the test program provides data essential to the credibility and management of the nation's deterrent forces, it is recommended that it continue at the UTTR. The exact level of future test operations will be established or modified as a function of weapon reliability, inventory, costs and other competing requirements. It is noted that relocation or combining CM tests with other activities would result in scheduling and priority access inefficiencies, and require the use of a facility less capable of meeting CM test objectives.

AFFECTED ENVIRONMENT

The CMSA is characterized by an arid climate, large expanses of nearly level terrain covered with a limited number of vegetation types, scattered north–south trending mountain ranges covered with smaller areas of diverse vegetation types that respond to variations in the physical environment, and animals that reflect the habitat diversity of this setting. Of particular note are: the water birds and other animals associated with large springs at Fish Springs National Wildlife Refuge, Blue Lake, and Mosquito Willys; the fall raptor migration route that funnels along the Goshute Range; large numbers of raptor nests, particularly north of the North Range and east of the South Range; and a number of plant and animal species of special concern. The vistas provided by the rugged Basin and Range topography are dramatic. The CMSA's isolated location, inhospitable climate, and the large parcels of public land managed primarily by the Department of Defense (DoD) and Bureau of Land Management (BLM) have kept human population densities low—population on the range is estimated to total less than 2,000 with an average density of approximately 0.1 person per square mile. Most of these persons live in small communities that have arisen around sources of fresh water. The CMSA's environment is characterized in detail in Chapter 3 of the EA.

IMPACTS OF THE PROPOSED ACTION

Impacts of the cruise missile test activity include those imposed by the missile itself, by its carrier aircraft (normally a B-52) and by the other aircraft and vehicles associated with the test. The aircraft, especially the fighter aircraft that visually chase the missile, impose some noise impacts on underlying terrain, wildlife and occasionally human observers. The missile itself imposes a smaller noise burden from its small turbofan engine. Finally, the missile imposes impacts at its point of ground impact. For the AGM-86B and the AGM-129, this impact is small, because the missile is flown to a pre-selected location where it is intentionally flown into the ground. Primary wreckage from this impact is that of the missile's structure itself and the non-explosive depleted uranium (DU) payload, which replicates the weight and volume of the actual combat payload. For the AGM-86C, impacts are considerably more dramatic, as this weapon is equipped and tested with either a 2,000 lb. or 3,000 lb. class conventional high explosive warhead. For this type test, more stringent limitations apply to routes and flight procedures, and the missile itself is permitted to detonate only at a specific target assessed, equipped and cleared for such activity. Conversely, other impacts of an AGM-86C test are less that those of other CM tests because the AGM-86C follows a much more closely prescribed flight path than the two unarmed missiles.

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 PURPOSE OF THE PROPOSED ACTION

To remain credible and effective, the strategic deterrent force of the United States must be equipped with weapon systems of proven reliable performance.[1] One way that performance is assured is through regular testing. Components are tested frequently, and corrective and improvement actions are initiated based on test results. However, cost and stockpile considerations demand that only a few full-up tests of strategic systems be accomplished each year. The Cruise Missile (CM) Test Program conducted at the Utah Test and Training Range (UTTR) ranks as one of the most important of such test events.

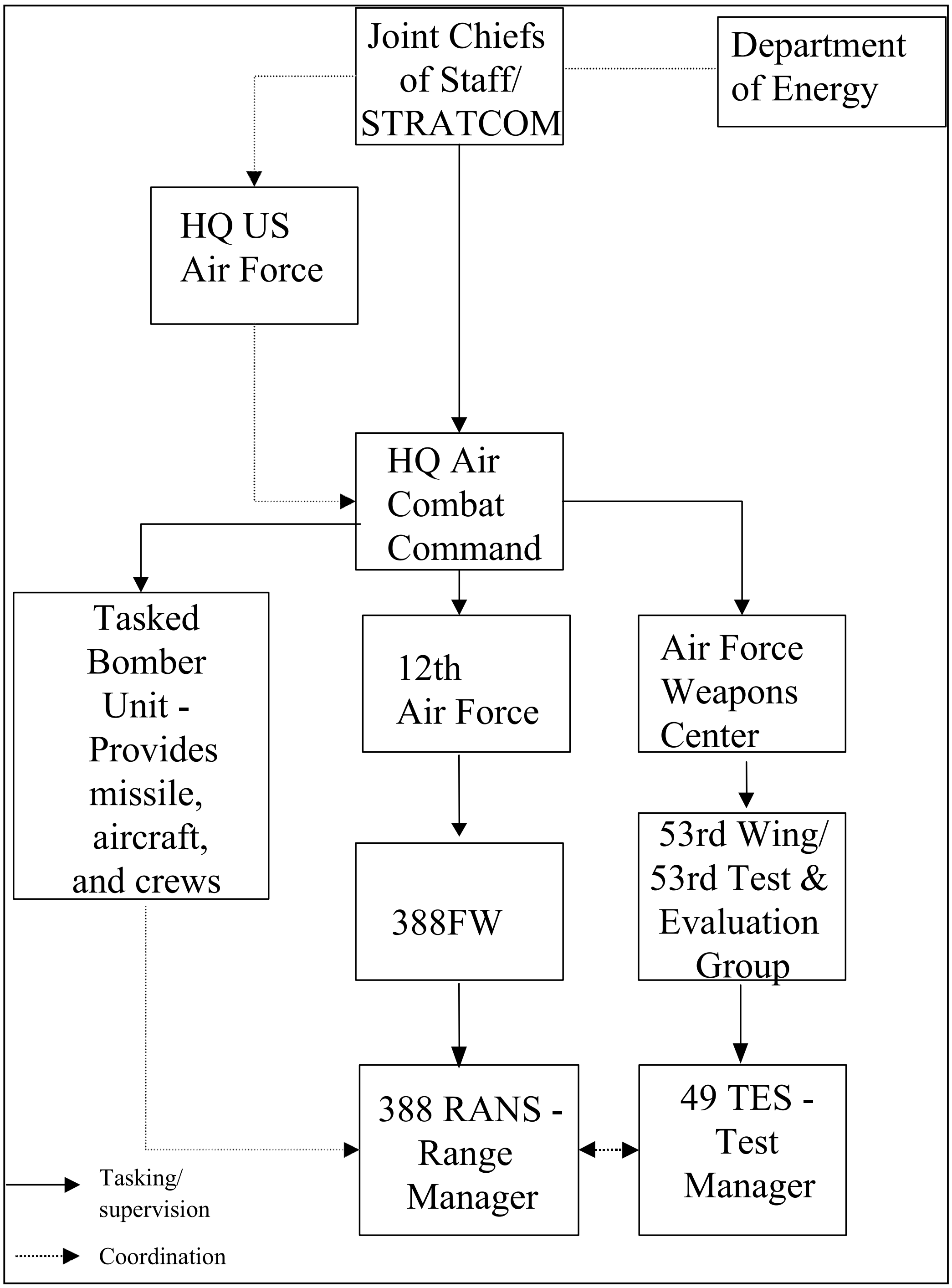
CMs' ability to provide accurate, focused and appropriate conventional firepower against an adversary is now familiar. However, the original impetus for design of these weapons, and an ongoing rationale for their retention, is strategic deterrence – the presentation of overwhelming strength and striking power so as to ensure another nation or organization does not attempt to strike at the vital interests of the United States. The CMs being tested on the UTTR—the Air Launched CM (ALCM or Air to Ground Missile (AGM)–86B), Conventional ALCM (CALCM or AGM–86C), and Advanced CM (ACM or AGM–129)—are delivered by US Air Force B-52 bomber aircraft and launched within the UTTR airspace. These are the only CMs addressed by this analysis.

The Commander in Chief, United States Strategic Command (CINC STRATCOM) is responsible to the Chairman of the Joint Chiefs of Staff for maintenance of the nation's strategic deterrence forces. These forces consist of submarine launched ballistic missiles, land based intercontinental ballistic missiles (ICBMs), and bomber aircraft, which may carry CMs. CINC STRATCOM does not exercise peacetime command of the forces assigned this role. Rather, the US Navy and US Air Force retain this authority and responsibility. Within the Air Force, Air Force Space Command oversees ICBM forces, while Air Combat Command (ACC) is responsible for the combat readiness of active duty bomber units, including the CMs carried by USAF bombers. ACC is responsible to CINC STRATCOM for ensuring that these units are capable of performing the STRATCOM mission.

The chain of command and tasking authority extends to the test authorization and planning process. STRATCOM must ensure that the weapons on which its mission depends are effective and reliable. Therefore, STRATCOM tasks ACC, via coordination with the Joint Chiefs of Staff and appropriate Headquarters USAF offices, to conduct shelf life tests of small numbers of its munitions. These tests are carried out in a realistic and demanding scenario. In implementing these tests, the 49th Test and Evaluation Squadron (49 TES), at Barksdale AFB, LA, coordinates all ACC CM test activities outside the UTTR, and the 388th Range Squadron (388 RANS), at

[1] *Joint Publication 1-02, "DOD Dictionary of Military and Associated Terms", defines a* ***weapons system*** *as " A combination of one or more weapons with all related equipment, materials, services, personnel and means of delivery and deployment (if applicable) required for self-sufficiency."*

Hill AFB, UT provides all necessary range resources. ACC provides bomber aircraft, aircrews and the missile to be tested from its units. The following diagram indicates the roles of tasked units:



1.2 PREVIOUS ENVIRONMENTAL DOCUMENTATION

Early testing of AGM–86B CMs by the U.S. Navy and the Air Force Aeronautical Systems Division was evaluated under NEPA in 1979 (Wiggins 1979, Haber 1979). In support of follow-on operational test and evaluation (FOT&E) of the AGM–86B, a 1983 EIS (SAC 1983) was prepared for a CM flight path using military training route (MTR) segments and special use airspace. This flight path began near the Pacific Ocean and continued to Tonopah, NV where it split and went to termination either east of Gandy, Utah or north of the Goshute Indian Reservation. In evaluating FOT&E of the AGM–86B along this flight path, the 1983 EIS relied primarily on data from the 1979 studies. The current study evaluates ongoing reliability testing of the AGM–86B in a much more restricted area, that of the UTTR airspace. In addition, this document addresses the AGM–86C and the AGM–129. The 1979 and 1983 NEPA evaluations of AGM–86B are applicable to the AGM–86C, as well, since the AGM–86C was converted from the AGM–86B and is essentially similar to it (See Appendix A). None of the CMs capable of carrying nuclear warheads is so equipped when tested; an occasional CALCM (which carries a conventional warhead) is tested live. The tests at UTTR focus on system performance during delivery rather than warhead performance.

1.3 NEED FOR THE PROPOSED ACTION

The essence of deterrence is credibility. A deterrent system must be seen as credible by the nations or organizations that it is intended to deter. It must also be proven reliable to its managers. The latter requirement is the impetus behind CM operational testing such as occurs at UTTR.

Our military leaders have declared the United States' deterrent forces sufficient to hold at risk enough targets of high enough value so that no nation would decide to initiate an attack upon the United States. To enable CINC STRATCOM and other senior leaders to have confidence in their declaration that the necessary targets can be struck, they must know how good their stockpile of weapons is, what deficiencies those weapons may possess, and whether the B-52 bombers and their crews are effective in delivering them. The results may in turn influence decisions regarding force structure and future weapons development, acquisition and deployment.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This Environmental Assessment (EA) addresses CM testing at the UTTR.[2] A CM is distinguished from other weapons delivered by aircraft by its long range, turbojet propulsion, winged design, and flight at subsonic speed. As a result of these characteristics, CMs are about 20 feet long and have a wing span of about 10 to 12 feet and a weight between 3,000 and 4,000 pounds. The CMs tested at the UTTR are the AGM–86B Air Launched CM (ALCM), AGM–86C Conventional Air Launched CM (CALCM), and AGM–129 Advanced CM (ACM).[3] Because the CALCM is tested with a live warhead, additional information regarding its flight protocols is provided in Appendix C.

2.1 DESCRIPTION OF THE CRUISE MISSILE TEST PROCESS

The United States Air Force conducts reliability and performance evaluations of its stock of air-launched CMs at the UTTR. These evaluations consist of captive carry of one or more such missiles beneath the wing or in the bomb bay of an Air Force aircraft (normally a B-52H)[4], subsequent launch and flight of the missile within UTTR airspace, and ground impact of the missile within the UTTR. These tests implement the Nuclear Weapon System Evaluation Program (WSEP), however, NO DEVICES CAPABLE OF A NUCLEAR YIELD ARE CARRIED BY THE MISSILES BEING TESTED AT THE UTTR.

A typical evaluation process includes:

- Mission Planning and Scheduling—Setting a test date (as much as one year in advance), selecting the unit to fly the aircraft, identifying the item to be tested (by nomenclature and serial number), identifying the test configuration for the weapon, and coordinating with Headquarters ACC, the selected support unit and with UTTR managers.

- CM Test Execution—Implementation of the planned test through cooperative effort of Headquarters ACC, the selected support unit and UTTR managers.

The 49 TES normally manages these two tasks. Offices and units above this organization may task and coordinate on specific test items, but management and execution of the test is a 49 TES responsibility.

2 *The UTTR is normally considered to include DoD ground, DoD scheduled Special Use Airspace, and infrastructure. By extension, the term can include the organization which manages the range. However, this study addresses all the North and South Range airspace and ground underlying that airspace, irrespective of ownership, unless specifically stated otherwise. Some comments in this document will refer to areas outside the range; where this is not obvious by the context, notes are inserted to explain the specific issue.*

3 *These missiles are depicted and described in Appendix B.*

4 *While these weapons have also been certified for carriage on the B-1B and B-2, the B-52 is normally used for this test event.*

The 49 TES designates a project officer who is to be responsible for all aspects of test planning, scheduling, and execution. That project officer is particularly tasked to interface between the tasked bomber unit (normally 2nd or 5th Bomb Wing), Headquarters ACC and other higher authority, other supporting units and the 388 RANS UTTR managers. Approximately two days prior to the test, the project officer and his team deploy to Hill AFB for onsite coordination with UTTR managers and execution of the mission.

2.1.1 Mission Planning and Scheduling

Each CM test is a part of an annual series of tests, with the test planning process extending considerably longer than the interval between tests. At any time, several events are in various stages of this process. Units are tasked as much as one year in advance, after 49 TES coordinates its requirements with other similar organizations at an annual ACC scheduling conference. On receipt of a tasking, the unit will integrate necessary preparation actions into its long-range plan. This may include identification of an aircrew and aircraft to conduct the test, and appointment of a unit project officer. However, the locus of overall test planning remains 49 TES (Salomon 1998).

A CM test mission is conducted to evaluate not only the missile itself, but the entire process by which the missile is employed. Therefore, the mission is not treated as an "academic" or laboratory event. The selected unit directs its aircrew to plan the mission as if it were an actual combat event. As in operational employment, the target is selected and the missile flight path is developed by a specialized office. The CM test mission has access to the entire South Range airspace; however, missile flight paths are restricted to some extent to ensure that other range users are not inordinately affected (note the area over Dugway Proving Ground (DPG) in Figure 2.1-1). They are also planned to minimize impacts on underlying communities and dwellings (a listing of flight avoidance areas is part of the flight planning information provided to the mission planners and aircrews).[5] Flight paths are also required to overfly certain surveyed areas to ensure proper functioning of the missiles' terrain contour matching (TERCOM) navigation system. With its highly varied terrain, UTTR provides a particularly effective environment in which to test the TERCOM system.

The CM test organization normally reserves the entire South Range of the UTTR for a test. A test is typically scheduled for a Tuesday morning, with backup days through Saturday of that week. When two such events are planned, they are scheduled for consecutive weeks. As noted above, advance planning for a test begins at least several months before the planned date; coordination between 49 TES and 388 RANS is essentially the first item on the planner's checklist.

A CM test has a considerable impact on other South Range use. The CM test program carries such priority that almost any other range activity must defer to it. Its lateral and vertical airspace

5 *See Appendix D for a list and depiction of these avoidance areas.*

requirements also limit the ability of other users to "work around" the test. Therefore other users employ a variety of methods to avoid major impacts and lost training. Fighters prioritize use of the North Range, which is not normally used by the CM test activity.[6] Should a CM test be cancelled, other users can "fill in behind" the test and take advantage of the unused range access. The 388 FW, which is responsible for long term range scheduling, does not schedule fighter activity within the window reserved for a CM test, but when the 388 RANS does the final schedule, they may tentatively schedule the South Range airspace as a fighter area backup, along with the North Range, and move the fighter activity to the North Range when the CM test actually happens. This option depends, of course, on when a cancellation decision is reached and disseminated. An early cancellation permits other users to replan activities to take advantage of range availability; late notice makes this more difficult (Munson 1998). Figure 2.1-1 below depicts the airspace and ground area available for CM testing. Note that CM test operations are designed to permit continued use of some DPG facilities. Specifically, those ground activities occurring east of 112º 15'W are not affected by planned CM flight paths:

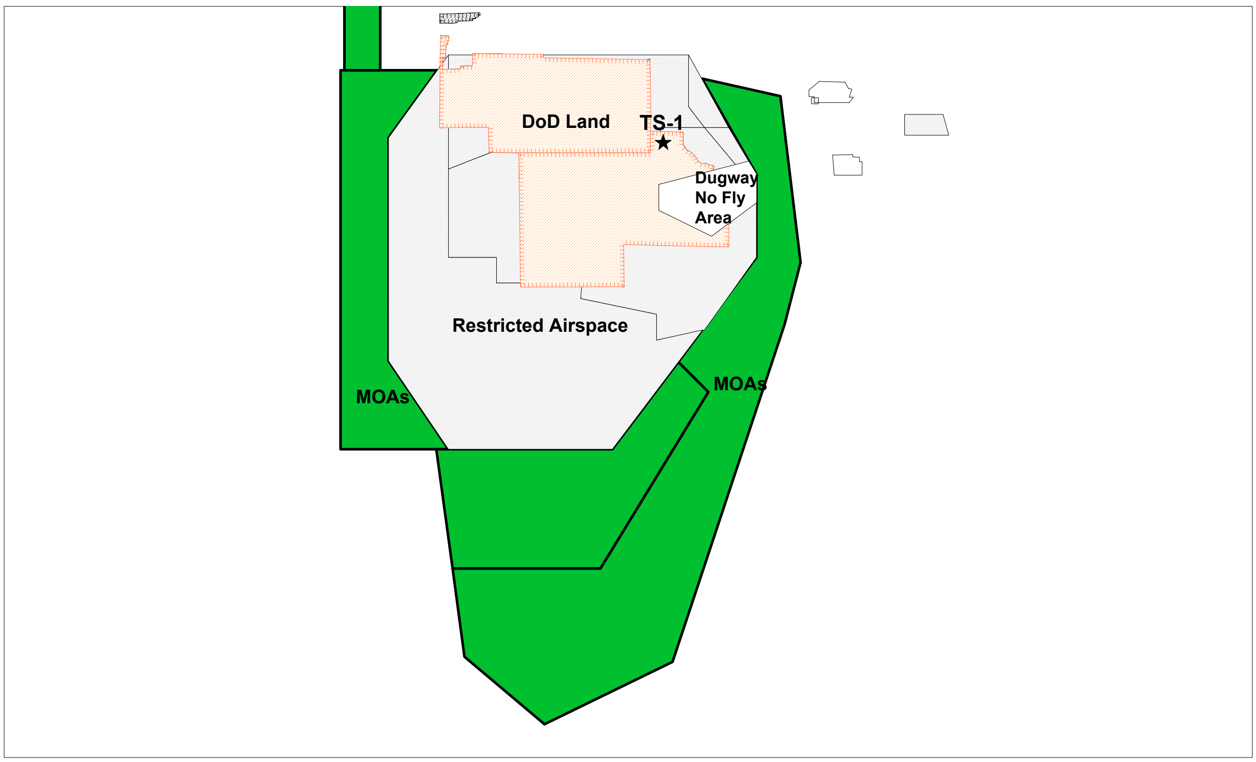


Figure 2.1-1 South Range Resources/
Southern Cruise Missile Study Area (CMSA)

[6] *CM tests do not now use North Range airspace or targets. However, these tests did use the North Range in the past, and could conceivably do so in the future.*

2.1.2 Cruise Missile Test Execution

2.1.2.1 Flight Procedures and Safety

On receipt of a tasking the unit will initiate necessary preparation actions. The unit project officer serves as the focal point for unit preparation and point of contact with 49 TES, which remains responsible for overall test planning.

Unit actions will include:

- Plan flight routing from takeoff to the test launch point at the UTTR. Schedule air refueling if required by the test plan. Review CM test profile.[7]
- Ensure aircrew currency and recent experience with CM launch procedures. Schedule aircrew for any required training or inflight currency events.
- Initiate aircrew communications training testing.[8]
- Plan and store mission data using the Mission Data Planning System approximately a month prior to the flight.
- Generate (inspect, configure and fuel) primary and backup carrier aircraft/missile launch equipment. Install Common Strategic Rotary Launcher (CSRL) and/or wing pylons.
- Configure missile with test payload and telemetry (in cooperation with 49 TES).[9]
- Aircrews perform preflight actions under simulated wartime conditions, but subject to the limitations imposed by peacetime safety criteria. The primary differences relate to protocols associated with the loading and delivery of the test vehicle.
- Schedule and coordinate necessary mission briefings.

2.1.3.2 Air Operations

CMs at UTTR fly in accordance with FAA Order 7610.4H, Chapter 12, Section 8, as modified by waivers specific to UTTR. The FAA Order "…prescribes policy, route development criteria, coordination procedures, special operating procedures, and additional publication requirements for cruise missile operations." More specifically, it constrains CM operations in excess of 250 knots (288 mph) below 10,000 AMSL to Restricted Areas, Military Operating Areas and selected IRs and also prescribes chase planes, communication aircraft, and daytime VFR

[7] *The unit does not select routing for the missile. This reflects both employment doctrine and the overriding concern for safety. Detachment 1, 608th Air Operations Group has primary responsibility for developing the missile profile. Weapons test managers coordinate with 388 RANS to ensure that the selected profiles can be accommodated within the range, and in accordance with stringent flight avoidance rules.*

[8] *The CM test mission is initiated with combat-formatted execution messages.*

[9] *Over about a two week period, unit personnel "build up" the test vehicle from unit stocks. Ballasted non-explosive warheads, constructed of Depleted Uranium (DU) that replicate combat warhead size, weight and balance are installed, and 49 TES personnel install unique telemetry and mission termination packages, necessary to ensure recovery of missile performance data and to provide a level of safety appropriate to peacetime employment of these weapons.*

operation with specific conditions of visibility. A 1995 waiver of certain specifications of the FAA Order prescribes restrictions specific to the UTTR airspace when CM tests are to be conducted outside restricted airspace. These restrictions require radar monitoring by Clover Control; primary responsibility for remote command and control and the flight termination system (RCC/FTS) to rest with the Air Force EC-135 or EC-18 Advanced Range Instrumentation Aircraft (ARIA) or the CM Mission Control Aircraft (CMMCA), which will be in constant communication with FAA; secondary responsibility for RCC/FTS to rest with the MCC where a test team member will coordinate with a Clover Control certified air traffic controller; and chase aircraft, in constant communication with the ARIA/CMMCA/ MCC, to be in continual visual contact with the CM. There is no expiration date on this waiver, although it was intended that these specifications be incorporated into FAA Order 7610.4H at some future time.

While the B-52 carrier aircraft is obviously the most important participant in the air operations part if this exercise, it is surely not the only one. The missile is tracked by an airborne telemetry platform, normally the ARIA (Internet: 452 FTS).[10] This aircraft trails the missile by 10-15 miles to ensure that its seven-foot diameter nose-mounted radar is able to track the missile. In addition, four fighter aircraft (F-15 and/or F-16) are deployed from Eglin AFB, FL, from Nellis AFB, NV, and occasionally from Hill AFB, UT, to "fly chase" and conduct visual surveillance of the missile.[11] These four aircraft cycle in turn through the chase position, with two chase aircraft normally in position following the missile, one refueling from a KC-135 or KC-10 tanker at higher altitudes, and one in transit between these locations. The tanker provides in-flight refueling for chase aircraft and, if necessary, for the B-52 carrier aircraft and ARIA (but not for the CMMCA, which cannot be air refueled). A helicopter stands on alert at Michael Army Airfield at Dugway Proving Ground, in case personnel are required to respond to unplanned flight termination or other incident. The helicopter may patrol the target or other areas if deemed necessary for security or safety reasons. In any case, following impact, the helicopter will fly to the missile's point of impact, whether it is the planned point or not.

2.1.3.3 Aircraft Mission Profile

The B-52 carrier aircraft normally launches from its home base (Barksdale AFB, LA, or Minot AFB, ND) early in the morning so as to arrive at the UTTR by mid-morning. The B-52 normally loiters in the area for about an hour to ensure that all operation functions are normal and that all range support functions are available and coordinated. Usually the B-52 enters the South Range airspace near Delta, UT, and holds on the range until time to launch or until conditions (weather, safety, telemetry, etc.) are acceptable for launch. Launch altitude is established by the governing operations order; however, as a rule the B-52 does not have to descend to low altitude (below 10,000 feet AMSL) to launch the missile. The missile is normally launched over DoD lands, west of Granite Mountain. For CM missions, the B-52 delivery aircraft does not fly a Military

10 *This telemetry aircraft is required to be on station for that test.*

11 *These aircraft may stage from Hill AFB; however, the missions are flown by pilots assigned to dedicated flight test units.*

Training Route en route to the UTTR. Figure 2.1-2 illustrates bomber home bases and flight distance to the UTTR:

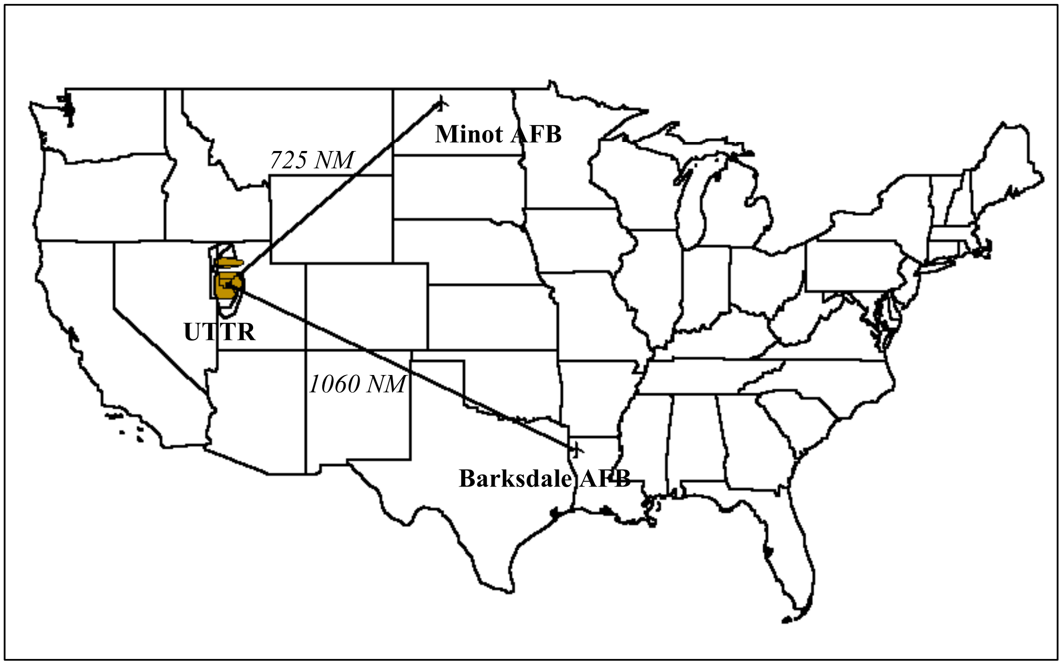


Figure 2.1-2 Home Bases and Typical Flight Routes for Tasked Bomber Units

The missile flies within the range airspace boundaries (including military operations areas, MOAs) for approximately two to five hours. During this time, a terrain following profile might take the CM to 300 to 500 feet AGL in the MOAs and to 250 feet AGL in the restricted areas (RAs). After flight operations on the range, it will fly to its target, and simulate the detonation of its warhead. The missile then terminates automatically and impacts the ground at a site that will preclude damage to any ground structure and will facilitate recovery of the wreckage. CALCMs typically impact at the CALCM target complex adjacent to TS-1, about five miles northwest of Wig Mountain (Figure 2.1-1), while ALCMs and ACMs typically use either a point on the ground or in the air at the High Target, or TS-1, for their programmed destination (Carter 2000). Because the CALCM is normally tested live, its planned target must be a UTTR location cleared for the expenditure of live munitions. The High Target is up off the mud flat on a bench of Cedar Mountain and 3.5 miles east and a bit south of TS–1 (Figure 2.1-1). Occasionally, CMs will use an alternative target. TS–2A, a 1500– by 3000–foot gravel pad immediately north of TS–2 (Figure 2.1-1) was used once by an inert CALCM and WSEP 1, a target north of Goodyear Road in the western portion of the South Range–Army, was used once by a live CALCM. These targets allow scoring and are accessible for both target rehabilitation and wreckage recovery (Carter 1999). TS–4 and TS–5 are potential targets for future use by CMs. The highly sophisticated Sand Island Target complex (TS–4) has threat emitters with which incoming CMs could interact in a live–fire test scenario (Hawkins n.d.); the TS–5 EA incorporated CMs in its user scenarios (Carter 1999).

2.1.2.4 Recovery

As noted above, an Air Force team is pre–positioned at Michael Army Airfield on DPG. This team is equipped with a helicopter, and will respond immediately to the impact point of the test, whether that point is the planned one or not. A comprehensive operations plan addresses each of the steps necessary for successful recovery of the test vehicle and protection of other resources, both natural and manmade. These steps include appropriate recovery of each of the CM system components: fuselage and wings, power plant and fuel, guidance package, and warhead. The fuselage and wings of the AGM 86 are made of aircraft grade aluminum alloy, while the AGM 129 fuselage is designed of specialized materials to enhance its stealth capabilities. Appendix B provides the dimensions and weight of these components. The power plant is a small Williams turbofan engine that varies only slightly among the three CMs tested at UTTR. This engine burns jet propellant (JP–10), a hydrocarbon fuel refined to enhance specific capabilities. The guidance package is an assemblage of electronics functioning as TERCOM, inertial, Global Positioning Satellite (GPS), or FTS systems and similar to aircraft avionics. The warhead of the ALCM and ACM typically contains depleted uranium (that simulates the mass of the live warhead which these two CMs are designed to deliver), while the warhead of the CALCM is of conventional explosives. Properly attired and briefed cleanup crews try to remove all vehicle parts having contents listed as hazardous materials, then bury the rest in place after reasonable retrieval efforts are made. ALCM retrieved parts are stored on the North Range until sold to a salvager. ACM retrieved parts are disposed of by shredding, incinerating, and then burying at an approved landfill such as those south of both the North Range and I–80, or are pulverized with explosives. There is little left of a detonated CALCM, but any retrieved parts are treated as the ALCM parts are.

Should a test not be completed (no launch) the mission and support aircraft will return to home stations or to a convenient deployment site for another attempt to complete the test. One exception applies: Should a missile not separate from its carrier aircraft and be in an unsafe condition (not sufficiently secure to withstand the flight to home station), the aircraft could be directed via a safe route to a relatively isolated landing area. For the UTTR, this option may involve use of Michael Army Airfield, the approach to which can be flown completely avoiding populated areas.

2.2 ALTERNATIVES TO BE CONSIDERED

<u>2.2.1 Proposed Action – Continue Current Number of Tests</u>

The Proposed Action reflects the ongoing CM test program at UTTR and is thus also the No Action Alternative. Currently, the CM evaluations described above are carried out at a rate of about six to eight flights per year.

Four alternatives to the Proposed Action are postulated for this assessment, which increase, decrease, relocate, or discontinue CM testing. They were evaluated on the basis of operational benefit and necessity, cost, overall environmental and operational impact and efficiency of operations.

2.2.2 Alternative 1 - Increase Number of Tests

This alternative would increase tests from the current six to eight per year to ten to 12 per year.

The current test program is intended to provide assurance to system managers and senior leadership that the stock of CMs and the procedures for employing these weapons provide the necessary level of effectiveness and reliability. Should it be determined that it is necessary to test more weapons to identify some suspected deficiency, to address some training issue or to obtain a higher level of confidence, an increase in activity (from the current six to eight tests per year to perhaps one test per month) could be accommodated at the UTTR. However, such an increase is unlikely because of impacts on already heavily tasked bomb squadrons and the increased costs of such testing (which may not, however, increase in proportion to the number of tests because weapon tracking and other support systems must be maintained in readiness regardless of how often they are used). In addition, because a CM test imposes a disproportionate impact on other range users, overall range scheduling stability would be negatively impacted.

2.2.3 Alternative 2 - Decrease Number of Tests

This alternative would decrease the number of tests to two to three per year.

This alternative would also be relatively simple to achieve. However, costs would not decrease in absolute proportion to the number of tests conducted, as certain overhead activities, such as maintenance of support systems, would need to continue regardless of the number of tests conducted. Fewer tests could also yield less reliable information on overall systems performance.

2.2.4 Alternative 3 - Relocate Tests

This alternative would relocate CM testing to another DoD range facility.

While consolidation of test activity and consequent reduction of potentially duplicated range and test infrastructure are ongoing DoD goals, in this instance that option appears to be inappropriate. The DoD has formally designated the UTTR as its test venue of choice for large footprint conventional weapons (Federal Register, 1995). The CM (in its test configurations) exemplifies that type of weapon. Therefore CM testing appears to be an appropriate activity at the UTTR, and the UTTR, with its large uninhabited areas and generous airspace, appears to be the optimum site for this testing. In fact, UTTR has always been the primary home of CM testing. The earliest development and testing of radio–controlled motor–driven bombs was performed at what was then Wendover Army Base by the Special Weapons Field Test Unit in the mid-1940s, with production oriented development changing to research and development of three classes of missiles when World War II ended. The transfer of Ogden Army Arsenal to the Air Force in 1955 expanded testing functions at what has since been designated the UTTR. Particularly during the 1959 to 1989 Cold War period, missile experimentation at UTTR was renewed (Green 1998), and has continued at a reduced level since. Furthermore, in addition to the scheduling and priority issues that would be raised by relocating the CM test activity to another large test range, the impacts of such an action on other users at that range would have to be assessed. Currently, most Major Range Test Facility Base (MRTFB) facilities operate with formal and informal scheduling systems which permit them to accommodate a variety of users. Should the CM test program be moved to another test facility, it is expected that existing scheduling and priority issues at that facility would substantially impact CM test efficiency, and in turn be affected by CM test priorities.

2.2.5 Alternative 4 - Discontinue Tests

This alternative would eliminate the CM testing program.

While elimination of the CM testing program would reduce the resources dedicated to this task, this alternative fails to satisfy the operational imperative that the managers of the CM system be kept aware of the systems' capabilities.

The following table summarizes the evaluation of alternatives: [12]

[12] *The rating values used in the table are subjective; however they are derived from analysis of the factors involved and data collected from UTTR managers and users.*

	Proposed Action (Ongoing)	**Alternative 1 (Increase)**	**Alternative 2 (Decrease)**	**Alternative 3 (Move)**	**Alternative 4 (Discontinue)**
Operational benefit and necessity	9	10	7	6	0
Total cost	8	6	8	4	10
Overall environmental impact	4	3	5	3	6
Operational impact	7	6	8	3	5
Efficiency of test operations	8	9	7	4	5
TOTAL	**36**	**34**	**35**	**20**	**26**

Ratings from 0 (worst) to 10 (best)

Operational benefit and necessity – the degree to which this action satisfies an operational need

Cost – comparative costs for pursuing each of these alternatives

Overall environmental impact – impact at UTTR and elsewhere as a result of implementing this action or alternative

Operational impact – impact at UTTR and elsewhere as a result of implementing this action or alternative (how much CM testing impacts other programs)

Efficiency of operations – whether this is the most effective way to conduct the testing.

In this analysis, the Proposed Action scores the highest, and is the preferred alternative. Alternatives 1 and 2 trailed only slightly in overall score, indicating that the fixed costs and impacts of this program are relatively insensitive to the number of tests conducted in a given period of time. Alternative 3, relocating the tests, imposes substantial operational and environmental penalties, as it would be accommodated at the expense of range users at other more congested facilities. Alternative 4 fails to satisfy the basic requirement that senior leaders be made and kept aware of weapons system status and capabilities.

3.0 AFFECTED ENVIRONMENT

The UTTR complex is in western Utah and eastern Nevada, occupying much of Box Elder, Tooele, Juab, and Millard Counties and extending slightly into Beaver County in Utah and in Elko and White Pine Counties in Nevada. It is irregularly shaped, but generally occupies the area from the Idaho border south to where Utah State Highway 21 (UT–21) passes through the Wah Wah Mountains in the vicinity of Milford, Utah and from about 24 miles west of the Nevada border eastward to a north–south line running through Delta, Utah. UTTR resources are composed of both airspace and ground.[13]

The UTTR airspace is divided into the North Range airspace and South Range airspace, which lie on either side of the Bonneville Corridor, which buffers I–80 between Salt Lake City and Wells, Nevada, except where a north–south airspace corridor crosses I–80 just west of Wendover, Utah. The UTTR airspace includes both RA and MOA airspace, which is further divided into numerous sectors that maximize the efficiency of airspace use.

The UTTR airspace lies above ground managed by the DoD, other nearby public lands, and private lands. The Air Force manages the North Range ground beneath the North Range airspace and the South Range–Air Force ground, which together with DPG managed by the U.S. Army (Army) lies beneath the South Range airspace. DPG is referred to as the South Range–Army by the Air Force because of its integral role in use of the South Range airspace (Hadley 1998). The Air Force also leases specific locales on Army land that support activities in the UTTR airspace (Zaccardi 1998, Teters 1998).

3.1 CLIMATE

The UTTR is characterized by an arid climate, highly variable temperature, and low relative humidity. Precipitation in the UTTR is chiefly from rain and snow during winter and ranges from 5 inches to 30 inches with changes in elevation and topography (U.S. Department of the Air Force 1989). Average daily temperatures range from 10 degrees Fahrenheit (°F) to 50°F in January and from 50°F to 100°F in July. During July and August, the daily temperature can range from below 60°F to more than 100°F, with the annual range being from -22°F to 105°F (Workman et al. 1992).

Throughout most of UTTR, the general north–south orientation of the mountain ranges results in valley surface winds primarily from the north or south, although upslope and downslope winds may modify this pattern. Topographical differences cause wind speed and direction to vary locally, as well as seasonally. Particularly during fall and winter, winds on the North Range tend to be from the northwest and southeast quadrants or from the northeast quadrant, depending on

[13] *The UTTR is normally considered to include DoD ground, DoD scheduled Special Use Airspace, and infrastructure. However, this study addresses all the North and South Range airspace and ground underlying that airspace, irrespective of ownership, unless specifically stated otherwise. For this purpose, the CMSA designation is used. Some comments in this document will refer to areas outside the range; where this is not obvious by the context, notes are inserted to explain the specific issue.*

location. Average speed varies from 5 to 10 miles per hour, but speeds up to 50 miles per hour, with gusts as high as 75 miles per hour, have been recorded in winter (Workman et al. 1992).

3.2 GEOLOGY

UTTR is characterized by a basin and range physiography, with fault–block mountain ranges that generally trend north–south and that are separated by flat desert basins. Only in the north end of the airspace does a mountain range, the Raft River Mountains, trend east–west. Land surface elevations across the UTTR range from a high of 12,101 feet above mean sea level (AMSL) to a low of about 4,200 feet AMSL. High elevations on DoD ground are 5,861 feet AMSL in the Lakeside Mountains on the North Range, 5,306 feet AMSL at Wildcat Mountain on the South Range–Air Force, and 7,068 feet AMSL at Granite Peak on the South Range–Army. High ground elevations throughout the rest of UTTR are in the Deep Creek Mountains (Ibapah Peak, 12,101 feet AMSL), the Snake Range (10,131 feet AMSL within the airspace and 13,063 feet AMSL at Wheeler Peak, just outside the airspace), and the Stansbury Mountains (Deseret Peak, 11,031 feet AMSL). For the most part, the high points in the numerous other mountain ranges within the UTTR are below 9,000 feet AMSL

Particularly important to the use of the UTTR airspace are the major valleys: Snake Valley (between the Snake and Confusion Ranges at the south end and between the Deep Creek Mountains and Fish Springs Range at the north end), Tule Valley (between the Confusion and House Ranges), and Whirlwind Valley (between the House Range and Drum Mountains); and further north, Fish Springs Flat (between the Fish Springs Range and the Thomas and Dugway Ranges), and Dugway Valley (between the Dugway Range and Simpson Mountains).

Rock formations exposed across the UTTR range in age from Precambrian to Quaternary (Doelling et al. 1980, Hintze 1980). The geology throughout western Utah varies in detail but is generally similar. The geology in the Raft River and Grouse Creek Mountains at the north end of the airspace is markedly different and has particularly significant gaps in the geologic strata from faulting and structural breaks (Hintze 1980). Caves, which are found scattered throughout UTTR, formed primarily when dissolution of carbonate rocks by groundwater was followed by collapse (BLM 1986c). Near the close of the Mesozoic Era as part of the Laramide Orogeny, the major period of mountain building, the rock formations in the area of UTTR were compressed to form large folds that trend north–south (Workman and Flannery 1989). The valleys between all these outcrops are primarily surficial deposits of alluvium and colluvium on the sides and Lake Bonneville sediments in the lowest areas (Hintze 1980).

The UTTR area is seismically active, with risk of seismic activity decreasing from east to west. Fifteen earthquakes of Richter magnitude 5.5 or greater have been recorded in Utah (Peterson 1986), but none larger than 4.9 have occurred since 1962 (USGS 1998). Mineralized resources are primarily associated with igneous intrusive rocks and have been historically developed; a few small areas are still active. Gold Hill, which is just west of the South Range–Army, is among the 10 most well known and well documented mining districts in the State. Highly unique building stone is found in the Raft River and Grouse Creek Mountains in the northwestern corner of the airspace (Workman and Flannery 1989).

Within the CMSA, there are 39 identified soil types (a small number of polygons lack data). The North Range, South Range–Air Force, and South Range–Army are primarily covered by Playas and Playas–Saltair Complex soils. The Playas soil type is predominant on the North Range (54.67%) and South Range–Air Force (61.73%), and still dominant but more nearly equal to the coverage of the Playas–Saltair Complex on the South Range–Army (28.14% versus 20.45%). These soils are found primarily in the low–lying, flat portions of the ranges. The next most common soil on the North Range is the Amtoft Dry–Rock Outcrop Complex that covers 6.99 percent of the area. On the South Range–Air Force, the next most common soil is the Saltair–Playas Complex (4.48%), while on the South Range–Army, the next most common soil is the Skumpah Silt Loam (9.40%). Most of the remaining soils are found covering slopes and upland areas. These consist primarily of silt loam, sand, gravelly–sandy loam, thin cobbly loams, and rock outcrops (NRCS 1997). Most of these soils are alkaline and covered with sparse vegetation. Very few of the soils that cover the North Range, South Range–Air Force, or South Range–Army are suitable for rangeland wildlife, cropland, or road and building site development or have very high range site productivity (Internet: statlab).

3.3 HYDROLOGY

No perennial streams originate on the North Range, South Range–Air Force, or South Range–Army, although there are perennial streams in the Deep Creek Mountains to the southwest, in the Pilot Mountains to the west, and in the Raft River, Grouse Creek and Goose Creek Mountains to the north. Also associated with the mountains are numerous perennial springs, the most notable of which are Blue Lake and Mosquito Willy's on the South Range–Air Force, and Fish Springs just south of the South Range–Army. On the ranges, any spring water or surface water flow generally infiltrates within a short distance, although minimal, saline surface water (that has not transpired or evaporated) may seasonally flow into an internal basin where it evaporates further (Gates and Kruer 1981, Stephens 1974). Particularly in springtime, the mudflats are inundated with water from snow that has fallen locally, as well as from snowmelt that runs off the surrounding mountains. During wet years, the North Range mudflats may be flooded by rising water levels in the Great Salt Lake.

The major groundwater reservoir beneath UTTR is the unconsolidated to partially consolidated basin fill, which is more than 1,000 feet thick and provides three major aquifers in the region. The shallow–brine aquifer underlies the mud flat area of playa soils and consists of the upper 25 feet of lake bed clay, silt, and crystalline salt. The alluvial–fan aquifer consists primarily of sand and gravel in surficial and buried alluvial fans along the flanks of mountain ranges such as the Newfoundland and Lakeside Mountains. The basin–fill aquifer consists of older alluvial sediments that probably underlie most of the North Range, South Range–Air Force, and South Range–Army at depth (Gates and Kruer 1981, Stephens 1974). The alluvial–fan aquifer yields water of the highest quality, providing fresh to moderately saline water (U.S. Department of the Air Force 1991).

3.4 ECOLOGY

The ecology of UTTR may be addressed in terms of aquatic and terrestrial communities. Aquatic communities are sparsely scattered throughout UTTR in association with mountain streams or groundwater upwellings. Terrestrial communities are dominant and vary primarily with topography, aspect, and soil, so that vegetation polygons are smaller and more diverse in mountainous areas and larger and less diverse in the lowlands. In addition, there are a number of special ecological considerations such as special studies and species of special concern.

3.4.1 Aquatic Ecology

For the most part, surface water on the North Range, South Range–Air Force, and South Range–Army does not support developed aquatic communities because it is transitory. This is true of the many acres of mud flats in the western portions of all three ranges. Exceptions are at Blue Lake and Mosquito Willy's springs on the South Range–Air Force, at several solid waste management units on DPG where standing surface water is replenished by anthropogenic sources, and, beyond DoD ground, the extensive springs at Fish Springs National Wildlife Refuge (NWR), which do provide aquatic habitat, as do numerous other smaller springs and several perennial streams, especially in the Deep Creek, Grouse Creek, and Raft River Mountains. Vertebrate animal species in the aquatic ecosystems of the UTTR have been documented primarily at Blue Lake and Mosquito Willy's and at the Fish Springs NWR. They include several species of concern such as the least chub (which is being reintroduced in a number of springs), the Bonneville cutthroat trout (found in Granite and Trout Creeks of the Deep Creek Mountains), and the Lahontan cutthroat trout (found in Bettridge and Donner Creeks in the Pilot Mountains); fish species such as Utah chub, mosquitofish, largemouth bass, bluegill, rainbow trout, brown trout, brook trout, Utah silverside minnow, Bonneville spring and speckled dace, many of which are introduced; bullfrogs, leopard frogs, and former habitat for the Columbia spotted frog; as well as thousands of waterfowl and other nonpasserine birds, particularly at Fish Springs NWR, and to a lesser extent at Blue Lake (BLM 1985a, Fairchild 1998, Gilbert 1998, Woodbury n.d., Zeigenfuss 1998). The number of waterfowl and other nonpasserine birds (which tend to be larger than passerines) at Fish Springs is quite large, particularly during migration (Figure 3.4-1; Gilbert 1998).

A recently completed management plan for the wetlands and mudflats on the North Range and South Range–Air Force identified three wetland types: a pickleweed–saltgrass–glasswort community, a saltgrass (or rabbitfoot beardgrass) community, and a bulrush–phragmites community. The saltgrass and bulrush–phragmites communities were categorized as jurisdictional wetlands; the pickleweed–saltgrass–glasswort community was tentatively categorized as jurisdictional. According to this survey, 99 percent of the North Range and 90 percent of the South Range–Air Force area categorized as jurisdictional wetlands were vegetated by the pickleweed–saltgrass–glasswort community (Parsons Engineering Science, Inc. 1995).

3.4.2 Terrestrial Ecology

3.4.2.1 Vegetation

Beneath the UTTR airspace, the general character of the vegetation changes with elevation, as mud flats give rise to pickleweed, desert shrubs and grasslands, mountain mahogany, and finally on ridge tops and higher slopes to trees that are primarily juniper but grade into aspen, pines, fir, and spruce on higher mountains. Of particular note are stands of bristlecone pine that occur primarily in limestone soils on taller windswept peaks above 9000 feet (BLM 1987b, 1988b, 1990b; Larson 1990). The vegetation is most completely characterized by cover types in the Utah Gap Analysis (GAP) data, which were developed by computer interpretation of Landsat

TM satellite imagery and ancillary data (Edwards et al. 1995). They represent the best broad scale analysis of Utah's vegetation, even though such modeling is subject to error (Edwards et al. 1998). In the mountains, with their topographic diversity and higher elevations, plant cover type polygons tend to be small and variable. In the lowlands of the West Desert, topographic and elevational variation is minimal and large polygons of just a few cover types (barren, pickleweed barrens, and salt desert scrub) are the norm. Thirty–two cover types were found beneath the airspace; there are also a few polygons having no data (BRRC 1997, Edwards et al. 1995). Five of these occur only within the Utah portion of the airspace (aspen/conifer, desert grassland, mountain fir, mountain fir/mountain shrub, and pickleweed barrens) and six of these occur only within the Nevada portion of the airspace (alpine, Great Basin subalpine pine, mountain sagebrush, playas, ponderosa pine, and white fir). The 26 cover types that are present beneath the Utah UTTR airspace are: water, barren, salt desert scrub, pickleweed barrens, grassland, sagebrush, sagebrush/perennial grass, desert grassland, dry meadow, greasewood, spruce–fir, mountain fir, mountain fir/mountain shrub; aspen, aspen/conifer, mountain shrub, mountain mahogany, pinyon, juniper, pinyon/juniper, lowland riparian, mountain riparian, wetland, wet meadow, agricultural, and urban (which, strictly speaking, is on DoD ground but outside the airspace in the Bonneville Corridor). Within the Nevada portion of the airspace, the three most abundant plant cover types are sagebrush (30.1%), sagebrush/perennial grass (22.2%), and salt desert scrub (19.5%). With the exception of the pinyon–juniper cover type (7.7%), all other plant cover types occupy less than 5 percent of the area beneath the Nevada airspace and a considerably smaller percentage under the airspace overall. The relative abundance of these cover types is shown in Table 3.4-1 and their distribution is shown in Figure 3.4-2. Lists of plant species identified on UTTR can be found especially in two publications: Workman et al. (1992) and Colleges of Natural Resources and Science (1997).

Specifically on the three pieces of DoD ground, the North Range, South Range–Air Force, and South Range–Army, the diversity of plant cover types is much lower than beneath the airspace overall and there are seven, ten, and 13 cover types present, respectively (BRRC 1997, Edwards et al. 1995). On DoD ground, the three most common cover types are salt desert scrub (34.9%), mud flat (barren (27.7%) plus covered with water (5.8%)=33.5%), and pickleweed barrens (24.4%). These three cover types are also the most common at each of the individual ranges, North Range, South Range–Air Force, and South Range–Army, although their relative abundance varies among these sites. Grassland is the next most abundant habitat in each of the ranges and occupies 2.8 percent or less of the North Range, South Range–Air Force, South Range–Army, and UTTR overall. Therefore, mud flat, salt desert scrub, and pickleweed barrens cover types are overwhelmingly the most abundant. Generally, the barren cover type is most abundant in the lowest areas to the west, the pickleweed barrens is on slightly higher ground, and the salt desert scrub is on still slightly higher ground and more abundant to the east, although the water and salt attributes of specific locales cause considerable interspersion of these types. Salt desert scrub is interspersed with other shrub types (sagebrush, greasewood) or with grassland depending on the soil type, aspect, topography and elevation, and previous disturbances at various locations in the uplands of the ranges. The habitats that are least abundant, but especially important because of the physiognomic diversity they contribute are: the wetland cover type plus the adjacent water cover type, the lowland riparian cover type; and the juniper and pinion–juniper cover types.

Because the cover types found on the North Range, South Range–Air Force, and South Range–Army generally represent groups of vegetation types that are combined on the basis of their physiognomic type (i.e., on the basis of general vegetation structure), they provide an approximation of wildlife habitat types as well. The general quality of the range wildlife habitat is indicated, at least for grazing animals, by the animal unit month (AUM) values for Bureau of Land Management (BLM) grazing lands surrounding the ranges. An AUM, the amount of range needed to support one cow and calf (or 5.1 sheep or 9.6 pronghorn) grazing for 1 month provides a measure of habitat quality. The more acres there are in an AUM, the lower the quality of the grazing it provides, since it takes more land to provide the same amount of forage. AUMs range from 1.15 to 35.2 acres across UTTR, but are mostly between 10 and 25 acres (Workman et al. 1992). Nearly all of the land managed by the BLM is subdivided into grazing allotments in which AUMs are allocated among livestock and wildlife.

3.4.2.2 Animals

Information on UTTR animals is available for insects (taxonomic lists), fish (scattered sampling and management), amphibians and reptiles (fortuitous observations), birds (transect data, nest surveys, and counts, especially at Fish Springs NWR and a hawk watch south of Goshute Peak), and mammals (scattered trapping and observations). The most readily observed and identified wildlife species in UTTR overall are: American kestrel, black–billed magpie, blackbird (sp.), common flicker, ferruginous hawk, golden eagle, horned lark, lark bunting, marsh hawk, meadowlark (sp.), mockingbird, mountain bluebird, mourning dove, prairie falcon, raven, red–tailed hawk, rough–legged hawk, short–eared owl, shrike (sp.), turkey vulture, and western kingbird, as well as mule deer, black–tailed jackrabbit, pronghorn, feral horse, porcupine, striped skunk, badger, and 13–lined ground squirrel (names followed by “sp.” are not identified to species). In wetland habitats, American avocet, black–crowned night heron, black–necked stilt, bufflehead, eared grebe, gadwall, green–winged teal, long–billed curlew, mallard, pied–billed grebe, pintail, ruddy duck, snowy egret, yellow–headed blackbird, and yellowthroat are also frequently encountered (Tate 1994, 1998).

Raptors are of particular interest because of their top trophic–level carnivore status. Raptor nests are concentrated in the northern end of the airspace along the boundary between Lucin A and B MOAs, southeast of the North Range, and east of the South Range (Colleges of Natural Resources and Science 1997, Edmonds 1998, Sheffey 1998). Primarily during fall, southbound raptors are funneled by the Black Pine, Raft River, Grouse Creek, Pilot, and Toana Mountains, veer westward to avoid the Great Salt Lake and Great Salt Lake Desert, and concentrate along the 63–mile–long ridge of the Goshute Mountains along the western edge of the airspace (Table 3.4-2), particularly between September 6 and October 17 (Hoffman 1998, Jewell et al. 1998). Few migrating raptors pass over the North Range or the eastern portions of the South Range (Workman 1986).

The most widely distributed mammals on the ranges are the black-tailed jackrabbit, desert cottontail, antelope ground squirrel, Great Basin pocket mouse, Ord’s kangaroo rat, western harvest mouse, deer mouse, desert woodrat, and porcupine. The deer mouse is the most frequently trapped small mammal in all habitats. Other mammals are significant because they are top carnivores (e.g., badger, kit fox, coyote, and bobcat) or game species (e.g., mule deer and pronghorn). Pronghorn are common although not widespread (Workman et al. 1992).

3.4.3 Special Ecological Considerations

Special studies of wildlife that are pertinent to impacts from UTTR uses have focused especially on noise and on the distribution of plants and animals within UTTR. Data on species of special concern are also of particular importance because of the diverse uses of UTTR.

The results of the selected studies on noise can be generalized as follows:

- For laboratory animals, considerations regarding the impacts of noise center around identification of overpressures that might cause physical damage to hearing (Bondello and Brattstrom 1978, Engineering and Services Center and USFWS 1988, Manci et al. 1987, Memphis State University 1971).
- In addition, numerous studies have documented physiological responses of animals to noise that show activation of the sympathetic nervous system and subsequently of several hormonal mechanisms associated with self preservation (Bondello and Brattstrom 1978, Engineering and Services Center and USFWS 1988, Manci et al. 1987, Memphis State University 1971).
- These noise studies of laboratory animals have often used acute exposure to extremely loud noises and high rates of application.
- Studies of domestic animals and wildlife have generally focused on productivity or behavioral changes as a result of noise exposure.
- Generally, productivity has been unaffected and behavior modifications have been transitory and have tended to ameliorate with repeated exposure as habituation occurs, although strongly flocking bird species appear particularly susceptible to noise impacts while in colonial nesting areas or migrating.
- Species with particular behaviors or physiological adaptations may be especially impacted by noise. For example, peregrine falcons, which incubate with their feet beneath their eggs, may eject the eggs from the nest if they leave the nest suddenly in a startle response, and kangaroo rats, which have an auditory mechanism designed to amplify the low frequency sounds of predators, may receive auditory damage when these frequencies are extremely loud.
- A few wildlife species have been subjected to physiological monitoring. While rapid increases in heart rate have been measured (up to four times normal), heart rate too exhibits accommodation with repeated exposure.

Thus, these noise studies have generally revealed that wildlife rapidly accommodate to noise, but impacts to several species with particular behaviors are still of some concern. Further, there is little information regarding long–term impacts of noise as a physiological stressor when it is acting in concert with the other stressors present in the natural environment of wildlife species.

Information on the distribution of plants, animals, and their habitat is being added to the UTTR database from ongoing five year studies—by Utah State University (USU) for the Plans and Programs Division (EMP) of the Hill AFB Environmental Management Directorate (EM)—that include inventories throughout UTTR, ecosystem mapping of DoD ground, and model development to predict species occurrence (Colleges of Natural Resources and Science 1997).

To date, information of particular interest from this program includes: (1) the identification of a rare species of land snail (*Oreohelix eurekensis*) within UTTR but not on DoD ground; (2) 1373 bird observations identifying 144 species in 1997 (including 57 species that were not recorded in 1996 and excluding 21 species that were observed in 1996), 11 bird species listed as of concern in Utah (American white pelican, bald eagle, burrowing owl, common yellowthroat, ferruginous hawk, Lewis' woodpecker, long-billed curlew, osprey, sage grouse, Swainson's hawk, and yellow-breasted chat), 72 nests of 10 raptor species and ongoing radio tracking of ferruginous hawks; (3) 1.3 percent small mammal trapping success on military lands, 1.9 percent on nonmilitary lands, and 1.6 percent trapping success overall for a 4800 trap night effort; (4) progress on producing a land form classification (based on electronic data reflecting elevation, slope, flow accumulation, and relief) that will facilitate management planning on UTTR; and (5) extensive vegetation surveys that have identified 1,156 species of vascular plants on UTTR and provided data that can be used to predict the other species, habitats and locales associated with selected species.

At the South Range–Army, a study of the relationship of Neotropical migratory birds to South Range–Army training events has collected data through a number of approaches (Martin 1998). The analysis of two years of data to date show 39 and 0 percent breeding success in the training areas compared to 60 and 39 percent success in the control plots. Further, grassland– or edge–preferring species increased where native juniper, sagebrush and greasewood canopy layers were impacted by wildfires and/or converted to annual exotic weeds, and two shrub steppe–obligate species showed a fluctuating but declining trend. Also at the South Range–Army, a small mammal trapping study sampled eight habitat types in 1996–1997 that had been previously sampled in 1956–1957. Based on 75,000 trap nights and the capture of 585 mammals representing 13 species, this study showed a significant decline in species abundance, species diversity and species richness (Martin et al. 1998).

Wildlife management on DoD ground is conducted by EMP; in most of the rest of the CMSA, BLM management activities include spring development; pipeline, well, reservoir, fence and cattleguard installation; and vegetation treatments in association with habitat protection and enhancement. The Utah Division of Wildlife Resources also has responsibility for resident species and manages game species primarily, while the USFWS has responsibility for nonresident species and manages migratory birds and threatened/endangered species primarily. Big game mammals, sage grouse, chukar, wild horses (in 11 management areas), waterfowl, wading birds, and raptors receive much of the management attention (G.Bennett 1998, P.Bennett 1998, Bonebrake 1998, Fairchild 1998, Gardner 1998, Perkins 1998, Reynolds 1998).

Species of Special Concern

Species of special concern include threatened and endangered species that are legally protected under Federal and/or state law, Federal candidate species and State of Utah Species of Special Concern that are under consideration for more protected status. They also include State of Utah Conservation Species that are currently receiving sufficient special management under a Conservation Agreement, as well as other species whose low local populations have attracted the concern of local researchers. While only the threatened and endangered species are legally protected, potential impacts to other species of concern are typically evaluated in the exercise of good environmental stewardship when substantive ground disturbing activities are proposed.

Therefore, species noted as being of concern for various reasons, as well as species that are legally protected as threatened or endangered are listed in Tables 3.4-3 and 3.4-4. Particular attention should be given to the listed status and footnote annotation in these tables, which show whether these species are legally protected or of biological concern, as well as whether the species has been documented on or near UTTR. Potential impacts to these species, which are considered present or reasonably likely to be present on UTTR, were evaluated in Section 4.0 and 5.0 of this document prior to reaching a Finding of No Significant Impact.

Among the species of special concern, no endangered and one threatened plant species (Ute ladies tresses, Spiranthes diluvialis) have been documented in the CMSA near Callao. An additional endangered species (Wright's fishhook-cactus, Sclerocactus wrightiae) and one threatened species (Last Chance townsendia, Townsendia aprica) have been identified in or near the CMSA. Plant species otherwise of concern are also present in or near the CMSA, however (Table 3.4-3; Internet: ~hafb 1998, Internet: statl-r6.html 1998).

Of the animal species of special concern in the region (Table 3.4-4; Banta 1998, Blood 1998, Federal Register 1997, Internet: statl-r6.html, U.S. Department of the Air Force n.d., Workman et al. 1992), the most likely to be within the CMSA are the peregrine falcon, bald eagle, and Lahontan cutthroat trout, and these species have been observed on or near UTTR. The peregrine falcon and bald eagle have been observed in the vicinity of Blue Lake and Fish Springs. Important roost areas for the bald eagle and peregrine falcon are known in the Sheeprock and Stansbury Mountains, a number of other bald eagle wintering areas are known in or near UTTR, as is a yearlong use area, and Skull Valley is an important use area for both species (Baxter 1985; BLM 1986d, 1987b, 1988a). The Lahontan cutthroat trout is found in the Pilot Mountains as mentioned previously. Of these three species, the peregrine falcon was recently delisted (Federal Register 1999a) and is no longer considered endangered, the bald eagle (currently a threatened species) was proposed for delisting on August 11, 1999 (Federal Register 1999b), and the Lahontan cutthroat trout is a Federal and State of Utah threatened species (Division of Endangered Species Staff 1999). Other animal species of special concern that have been observed on the ranges and are known to breed within the CMSA are the long-billed curlew, white-faced ibis, snowy plover, burrowing owl, and ferruginous hawk. The Utah physa snail, least chub, Columbia spotted frog (historic range only), Skull Valley pocket gopher, Bonneville pocket gopher, and Swasey Spring pocket gopher are known to occur within the CMSA near the ranges (Colleges of Natural Resources and Science 1997, Edmonds 1998, Gilbert 1998, Mann 1998, Sheffey 1998, Tate 1998, Workman et al. 1992).

3.5 CULTURAL RESOURCES

A wide range of prehistoric, historic, and paleontological resources occur on and near the North Range, South Range–Air Force, and South Range–Army. Cultural resource surveys have resulted in the identification of more than 130 archeological sites within 30 miles of the North Range and South Range–Air Force boundaries.

Most of UTTR, which consists of mud and salt flats or relatively recent eolian deposits, has virtually no potential for paleontological resources. The cultural resources are clustered in other areas. Beginning in 1991, the North Range and the South Range–Air Force have been subject to large-scale, stratified surveys. To date, these intense, pedestrian surveys have covered 25 percent of the North Range and 19 percent of the South Range–Air Force (Hall 1998). Seven of the higher-density areas have been recommended for nomination as National Register Districts (NRDs) (Workman et al. 1993) and proposed actions occurring within these districts will trigger evaluations even though they have already been surveyed. Most of the land within these districts contains no or very few resources and restricted development should be possible. At the South Range–Army, where less than 1 percent of the range has been surveyed, various cultural resource surveys, formal and informal, have resulted in the identification of 112 sites (Callister 1998).

The prehistory of the region encompassing UTTR can be divided into five major periods: Bonneville (9000 to 7500 BC), Wendover (7500 to 4000 BC), Black Rock (4000 BC to AD 500), Fremont (AD 500 to 1300), and Late Prehistoric (AD 1300 to 1850). The Historic Period in the UTTR region can be divided into three periods: Exploration and transportation (1820s to 1870s), Development (1880s to 1930s), and Military (1940s to present). Each of these periods is represented on UTTR.

The pre–historic resources include lithic scatters, open lithic scatters, open artifact scatters, activity areas, fire–cracked rock, pinto point areas, western stemmed series sites, rockshelters and cave sites. Of particular interest are several large–scale archeological excavations of dry cave sites that have been carried out in the vicinity of the ranges and added greatly to the understanding of West Desert paleoenvironment and subsistence choices. The historic resources include but are not limited to WWII and Cold War Resources such as missile launch ramps, target areas and railroad resources, as well as historic can scatters (Callister 1998, Enviro-Support, Inc. et al. 1998, Hall 1998). At the South Range–Army, German Village (Internet: ~dugway 1998) has been identified as eligible for National Register of Historic Places (NRHP) inclusion and the Lincoln Highway Bridge is on the NRHP (Callister 1998, U.S. Department of the Army 1996). A cave in Camels Back Ridge has been extensively tested and has revealed numerous temporary occupations dating back perhaps 11,000 years (U.S. Department of the Army 1996, The Denver Post 1998). An extensive review of the history of the UTTR between 1941 and 1989 was recently completed (Green 1997) and reveals much about the development and evolution of the training and test functions of the area.

Most of the western UTTR, which consists of mud flats or relatively recent eolian deposits, has virtually no potential for paleontological resources; however, sporadic occurrences have been identified. These finds have included well–preserved fossil fishes in Mississippian–age Great Blue Limestone, paleoenvironmental assemblages in cave sites from the more recent Holocene and Late Pleistocene, and abundant and diverse lower Ordovician marine invertebrate fossils at the south end of the Confusion Range, which is one of the foremost locations in the U.S. for wealth and variety of Ordovician life forms (BLM 1986d; Gillette 1994; Madsen 1994; Mehringer 1973, 1977, 1986; Schmitt 1994; Workman et al. 1993).

3.6 VISUAL RESOURCES

The visual resources of the lands comprising and adjacent to the North Range, South Range–Air Force, and South Range–Army are typical of the Great Salt Lake Desert. They are characterized by isolation, remoteness, expansive open space, and dramatic basin and range landforms. Within the 70 miles of I–80 between the Stansbury Mountains and Wendover on the Utah–Nevada border, the northern views encompass the Lakeside Mountains, Puddle Valley, the Grassy

Mountains, the Newfoundland Evaporation Basin (the lowest point in the region outside the Great Salt Lake), the Bonneville Salt Flats, Floating Island, and the Silver Island Mountains. Similarly, views to the south of I–80 include the north Stansbury Mountains, Skull Valley, the Cedar Mountains, and a wide basin with the Dugway, Thomas, Fish Springs, and Deep Creek Mountain Ranges to the south of the South Range–Air Force and South Range–Army. This basin and range landform pattern continues westward across the Nevada desert and southward to the end of the UTTR airspace. Most of the BLM land within UTTR is Visual Resource Management (VRM) Class IV[14], with some scattered Class III lands, fewer Class II lands, and no Class I lands (BLM 1985a, 1986d, 1987a, 1988a, 1988c; Hill 1996). If the BLM VRM classification of visual resources were applied on the ranges, almost all of the lands within their boundaries would also be designated Class IV, since views of their significant, but not unique, landscape features are limited to distant vistas from adjacent private or unrestricted public lands, many of which are very isolated and difficult to access even though they are open to the public. However, if the WSAs and newly inventoried lands with wilderness character (WCAs) discussed in Section 3.7.1 were to become designated wilderness areas, they would be recategorized as Class I by definition.

3.7 SOCIOECONOMICS

The lands surrounding the North Range, South Range–Air Force, and South Range–Army are owned or managed by Federal, state, and tribal governments or by private individuals. They are used to a limited extent for commercial and residential purposes and for recreation, and are supported by a limited infrastructure.

3.7.1 Land Ownership

Federal lands beneath the UTTR airspace are managed primarily by DoD and BLM. The land base of the North Range and South Range–Air Force, managed by the Air Force, is approximately 928,000 acres (North Range—351,539 acres; South Range–Air Force—576,157 acres). The South Range–Army, managed by the Army, has a land base of 801,000 acres, portions of which are used by the Air Force on a share–use basis through an agreement with the Army. Together, these three DoD land areas comprise over 1,700,000 acres, while the airspace of the UTTR overlies approximately 10,700,000 acres.

Much of the nonDoD land of UTTR is managed by the BLM. Six BLM resource areas (field office areas of responsibility) extend in part beneath the UTTR: Box Elder, Pony Express, House Springs, and Warm Springs Resource Areas in Utah (Thayn 1998), and the Wells and Schell Resource Areas in Nevada. In addition, small areas of the UTTR extend southward beyond the Warm Springs Resource Area into the portion of the Beaver River Resource Area covered by the Pinion Management Framework Plan, which was not available for review

[14] *The VRM guidelines prescribe the following: Class I—no degradation of views (designated wilderness areas or other special–use areas); Class II—retention of existing landscape character, but allowing visible management activities that do not attract the attention of casual observers; Class III—partial retention of existing landscape character, but allowing management activities to attract attention but not dominate the view of casual observers; Class IV—minimizing the impact of management activities, but allowing major modification of the existing character of the landscape.*

(Roberts 1998). For each of the six major resource areas, a resource management plan has been written, together with an EIS that addresses alternative management options for the area (BLM 1983b, 1985a, 1985c, 1986a, 1986b, 1987a, 1988a, and 1988c). The Box Elder Resource Management Plan has been amended recently (BLM 1998). See Figure 3.7-2 for a depiction of these areas.

These resource management plans particularly focus on integrated use of the resources in each of these areas, particularly grazing of livestock, wildlife, and wild horses and recreational use of natural and cultural resources. Resource management plan alternatives considered in an EIS propose different balances among these sometimes competing uses. In association with grazing, these alternatives establish carrying capacities and AUM allocations for various species, assess range conditions, and prescribe how these will be managed and maintained and how water resources will be developed. In association with recreational enjoyment of natural and cultural resources, areas of critical environmental concern, wildlife habitat areas, areas especially used by selected species, unique geologic features, and scenic byways and backways, the alternatives identify such areas and prescribe how they will be managed to conserve their resources.

BLM management of wilderness study areas (WSAs) is particularly prescribed so as not to "...impair the suitability of such areas for preservation as wilderness", so any uses ongoing when the Federal Land Policy and Management Act of 1976 (FLPMA) was enacted are allowed, but must be carefully managed to avoid degradation of the wilderness attributes of the land. To date only one wilderness area has been established within UTTR, the Deseret Peak Wilderness Area. However, there are 11 WSAs in Utah (BLM 1980, 1985b, 1990a, 1990b; U.S. Department of the Air Force and U.S. Department of the Interior 1990) and two WSAs in Nevada (BLM 1983a, 1985b, 1988b) that are close to or within UTTR. The 50,500–acre Cedar Mountains area, the 52,500–acre Fish Springs area, and the 68,910–acre Deep Creek Mountains area are the closest to DoD ground (Figure 3.7-1). Particularly in Utah, there have been numerous wilderness designation proposals that vary in the size and shape of the WSAs included, the number of WSAs included, and in whether lands in addition to the designated WSAs have been included (Kelsey 1996, 1998). These vary from zero acres (under the No Action/No Wilderness Alternative) to 16,000,000 acres (under a proposal that includes undetermined amounts of BLM land). In an attempt to resolve the 20–year–old debate on wilderness designation in Utah, Secretary Bruce Babbitt directed a field review of lands outside the 3,235,834 WSA acres previously evaluated by BLM (BLM 1990), but at least partially included in the 5.7 million acres proposed repeatedly by HR1500. As a result of this evaluation of 3,636,330 additional acres, BLM identified 3,049,900 acres that have wilderness characteristics. Of these, 344,810 acres are beneath or near the UTTR airspace (Figure 3.7-1). For the most part, these wilderness character areas (WCAs) are adjacent to existing WSA lands. However, four new areas were identified beneath the UTTR airspace: the Dugway Mountains beneath the South Range Airspace, and the Pilot Range, Silver Island Mountains, and Newfoundland Mountains beneath the North Range Airspace (BLM 1999). As part of their planning process, BLM is currently evaluating the WCAs as to their potential manageability as WSAs, based on such considerations as resource and ownership conflicts. At the end of this planning process, BLM will determine which of the WCAs should be designated as WSAs. Meanwhile, Utah Governor Leavitt and Interior Secretary Babbitt have decided to support incremental wilderness designation and are developing draft legislation that proposes 1.1 million acres in the West Desert as wilderness (including all the regional WSAs except Rockwell, 500,000 acres of WCAs, and 200,000 acres from citizen's proposals). In addition, the HR1500 proposal has been replaced by a 9.1–million–acre–proposal introduced in the spring of 1999 as HR 1732 and S861 (Kelsey 1999). The U.S. Congress must act on the proposal(s) that are ultimately brought before it (Kelsey 1998) before any additional wilderness is designated (Trainor 2000).[15]

In addition to the BLM, other agencies own or manage smaller amounts of land within UTTR. There are small components of National Forest Land (Sawtooth National Forest, Wasatch–Cache National Forest, and Humboldt National Forest) beneath or adjacent to the UTTR airspace in Utah and Nevada. Great Basin National Park, in the southern portion of the Snake Range, is the closest National Park Service land to UTTR and is outside the UTTR airspace but has the airspace within its viewshed. The 18,000–acre Fish Springs NWR adjoins the southern boundary of the South Range–Army, is wholly within UTTR and surrounded by active flight paths, though the refuge is a flight avoidance area. Four sections of state trust land (generally Sections 2, 16, 32, and 35) are typically found within most townships, but those that were formerly within the North Range, South Range–Air Force, and South Range–Army have been acquired by DoD.

Private land is found primarily in the vicinity of Wendover (divided by the Utah–Nevada state line into Wendover, Utah (population: 1,127) and West Wendover, Nevada (population: 2,007)); in the Snake Valley (Gold Hill (12), Callao (50), Trout Creek (35), Partoun (200, Webster 1995; plus about 100 to 150 students from surrounding areas including Pleasant Valley when school is in session, Banta 1998), Gandy (4), Granite Ranch (12), and Eskdale (300) (Webster 1995)); in Pleasant Valley at the south end of the Deep Creek Range (Uvada; 25); on the west side of the Deep Creeks (Ibapah (100) and Goshute (100)); in the Raft River and Grouse Creek Mountains (Grouse Creek (175), Lynn (10), Etna (15)) and their foothills (Park Valley (200)); or to the west of the Goose Creek Mountain foothills (Montello (200)). There is also a community at English Village on the South Range–Army in association with the Army presence on this range.

3.7.2 Land Uses

In the immediate vicinity of the North Range. South Range–Air Force, and South Range–Army there is little industrial, commercial, or residential development. The military lands are used by the Air Force primarily for training and testing of military personnel and weapons. The Army's mission at DPG is the testing of materiel (e.g., clothing and equipment) protective against chemical or biological attack, as well as the testing of smoke and obscurant systems and methods for decontamination, neutralization and detection of chemical or biological threat agents, and environmental technology testing (Internet: dmission.html 1998).

The BLM lands are used primarily for grazing and recreation. Recreation on lands adjacent to and near the DoD land boundaries is generally associated with the mountain ranges, springs, and seeps in the basin. There are few developed facilities, but the primitive camping, trails, and off–road vehicle access provide opportunities for pristine solitude and 100–mile vistas (Barnes 1998). Although much of the land administered by the BLM is open to off-road vehicle (ORV)

15 *As a result of legislative initiatives undertaken in the fall of 1999, the Air Force is now conducting an evaluation of the potential effect of Wilderness Designation on UTTR utilization. The results of this analysis, now in progress, should significantly affect the future course of this issue.*

use (including the Knolls ORV area, a BLM recreational area along the north boundary of South Range–Air Force ground), some sensitive areas are closed to or have restrictions on ORV use. The backcountry routes that BLM has designated as backways or byways are undeveloped dirt roads but in good weather are passable in two–wheel–drive vehicles. The renowned Bonneville Salt Flats speedway is also managed by the BLM. There have been no major conflicts regarding trespass on DoD lands for recreational activities because the ranges are remote, the nearby population is sparse, and there are large tracts of nearby land available for public access. However, the Knolls area has experienced some increase in instances of trespass and fence damage, apparently by ORV users. Hunting visitation to the Stansbury and Cedar Mountains, the Deep Creek Range, and Fish Springs NWR exceeds 5,000 visits annually.

Some industrial uses on lands adjacent to the ranges include minerals extraction and processing, mining, landfills/waste incineration, and brine shrimp collection. In the vicinity of Wendover, casinos (in West Wendover, NV), hotels and motels, service stations, stores, recreational vehicle camps, and related tourist facilities are found. Much of the trade and economic activity here is related to gambling.

3.7.3 Infrastructure

The Salt Lake City metropolitan area, about 50 miles east of the North Range, is the largest populated area in the region. Denver, Colorado, is about 500 miles east; Las Vegas, Nevada, is about 400 miles southwest, and Boise, Idaho, is nearly 400 miles northwest of UTTR. Several transportation corridors cross or come close to UTTR, including three railroad corridors (the Southern Pacific Lucin Cutoff, Western Pacific, and Union Pacific) and four east–west highway corridors (UT–30, I–80, US–6/50, and UT–21). The main initial access route to the North Range, South Range–Air Force, and South Range–Army is I–80. Numerous county and other roads afford public access to BLM lands and other areas in the West Desert beneath the UTTR airspace, but fewer than 125 miles of these roads are paved. The remainder of the roads beneath the UTTR airspace are dirt, with some having varying amounts of gravel; they also vary in design, but some are well–crowned and more useable under wet conditions than others. Within the ranges, improved access routes are generally utilitarian and associated with specific, frequent activities. Elsewhere on the ranges, ground vehicular access is difficult because the area is isolated and undeveloped, the environment is harsh, and the mud flats provide very poor road base.

3.7.4 Regional Socioeconomics

While the North Range, South Range–Air Force, and South Range–Army are fairly isolated, on–site activities do affect the economies of the five counties overlain by the airspace as well as the economies of nearby counties. The airspace overlies most of Box Elder, Tooele, Juab, and Millard Counties and small portions of Beaver, White Pine, and Elko Counties. Census statistics show employees in at least the Utah counties to work primarily in manufacturing, retail trade, and services (Internet: census 1998). However, even though each of the Utah counties (except Beaver) has almost its entire area beneath the UTTR airspace, the preponderance of its population lies to the east, just outside the airspace. Therefore, in the large proportion of each Utah county (except Beaver) the preponderant industries are actually military, agriculture, and mining.

Because of the sparse population, limited access to most of the land beneath the UTTR airspace, and the rural life style, the solitude within each of the small communities beneath the UTTR airspace is considerable. The military activities that occur in the airspace above these communities can result in overflights of aircraft and noise (including sonic booms).

Overflights of CMs or other unmanned air vehicles and their associated chase planes, tankers, and communications aircraft, of aircraft delivering test munitions, or training aircraft (most typically single aircraft or groups of two or four aircraft) occur in the UTTR airspace. The test vehicles or munitions may be aiming for ground landing sites or established munitions targets on DoD ground, or be detonated above DoD ground. The training aircraft may be aiming for established munitions targets on DoD ground or involved in strictly aerial maneuvers.

Noise is generated by chase aircraft, delivery aircraft, support aircraft, and training aircraft. The effects of noise have been investigated by studies that have centered around identification of overpressures that might cause physical damage to hearing, that may result in unacceptable annoyance, or that may result in structural damage. These studies have resulted in the establishment of protective auditory criteria for humans, but have revealed no generally accepted scientific evidence of nonauditory ill health resulting from noise, although the startle effect and temporary disruption of ongoing tasks are readily acknowledged.

To minimize the disruption of West Desert solitude by military use of the airspace, military flights are restricted by the establishment of: (1) minimum flight altitudes outside DoD land, (2) the establishment of flight avoidance areas in the vicinity of occupied communities and Fish Springs NWR, and (3) the establishment of supersonic airspace wholly within the RAs and part of the Gandy MOA (388th Range Squadron 1998a, 1998b; U.S. Department of the Air Force 1993). The UTTR airspace is segregated into RAs and MOAs, which generally overlie DoD ground and nonDoD ground. In many of the RAs (R6402A, R6404A, R6404B, R6406A, and R6407), airspace minimum altitudes are at the surface. Minimum altitudes for the remaining restricted airspace (except R6404D, which overlies R6404B) and for the MOAs (except Sevier C and Sevier D, which overlie Sevier A and Sevier B, respectively) are 100 feet above ground level (AGL). The situation is made more complex, however, by the further subdivision of the RAs into low and high altitude sectors (whose boundaries do not match the internal RA subdivisions), which also have minimum altitudes. In the North Range airspace RAs, Low Altitude Sector C extends down to 100 feet AGL and Low Altitude Sector N extends down to 500 feet AGL; thus, these two portions of R6404A and R6404B do not extend down to the surface as the remainder of these two RAs does. In the South Range airspace RAs, Low Altitude Sectors T and M extend to 100 feet AGL while the remainder of R6402A and R6405 extend down to the surface. The flight avoidance areas prohibit flight below an altitude of 3,000 feet above the highest obstacle within a horizontal radius of 1.5 nautical miles (1.7 miles) of populated areas and also below 3,000 feet AGL over the entire Fish Springs area. Thus, the flight avoidance areas establish cylinders of exclusion below 3,000 feet that are surrounded by airspace that extends down to either to 100 feet AGL or the surface. Within the supersonic operating area (SOA), supersonic speed is permitted down to 5,000 feet AGL; elsewhere supersonic flight is allowed only above 30,000 AMSL. High altitude sectors, which lie above the low altitude sectors but do not coincide with their boundaries except in the South Range, have their activities generally far enough away to avoid ground impacts.

Restrictions on low and supersonic flight have not completely resolved issues associated with the intrusion of low overflights, noise and the startle effect on community solitude. Particularly during opposed training scenarios, flight restrictions are sometimes inadvertently violated by pilots who stray across an airspace boundary (vertical or horizontal) or break the sound barrier while focusing on their primary mission, which is to train under the most realistic scenarios possible to maximize their combat readiness. As a result, complaints about low overflights and/or noise are sometimes received by the Air Force. There is ongoing dialog among these users to attempt to further minimize these impacts and better understand mutual needs. (Smith 1998, Trainor 1998)

The CM delivery and support aircraft typically remain at high altitudes and do not contribute substantively to noise. The chase aircraft and CM remain at subsonic speeds and follow a prescribed flight path, so are much less likely to contribute to noise than aircraft engaged in training activities.

4.0 IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES ON ENVIRONMENTAL RESOURCES

Impacts may result from normal CM flights and, occasionally, from mishaps during CM tests. Impacts from normal CM flights result from overflights of the missile and its associated chase, surveillance, and tanker aircraft, from air or ground detonation of the missile or its landing without detonation, and from the activities of ground crews in the vicinity of its detonation or landing target. These ground crews follow an established safety protocol when they visit the target to investigate details of the missile's detonation or landing, or to periodically remove detonation debris from the target. Impacts from mishaps may involve an aircraft or missile landing in an unintended location by crashing or activation of its FTS. Ground crews visiting such locations also follow an established safety protocol, although they may cause greater impacts than at established targets, because mishap locations are less likely to have roads leading directly to them and may be more heavily vegetated or near environmentally sensitive spots such as wetlands.

The 1983 NEPA evaluation of CMs (SAC 1983) relied heavily on extensive evaluations performed for the 1970 NEPA documents (Wiggins 1979, Haber 1979). These documents carefully considered the physical characteristics of the ALCM and of jet fuel (CM engines burn JP-10 fuel), the potential impacts from released effluents and noise from air vehicles during flight, the possibility of CM collision with low–flying aircraft and of vehicle failure (and consequent impacts) along a route that stretched from the Pacific Ocean to eastern Nevada and western Utah. The 1983 NEPA document concluded that during a successful flight: emissions would be only short–term, low–level concentrations of engine exhausts below the flight path; noise would be only transient high levels below the flight path with possible disturbance of wildlife, but no sonic boom or hearing damage; and air collisions would be a low–probability event since no military or scheduled air traffic would be in the flight path and general aviation would be alerted with published warnings. Even during a flight failure, emissions and noise would not be increased (except perhaps briefly at the site of impact), and air collision remained a low–probability event. Any falling debris or the presence of a crash site would have little likelihood of harming anyone because the flight corridor avoided populated areas. The one potentially substantive impact from a flight failure would be fire, which could cause extensive losses if it spread unchecked in a highly burnable area. Thus, fire emerged as the primary impact of concern in the 1983 NEPA document, even though that EIS evaluated a CM flight corridor of over 1700 miles. Based on this conclusion, and the considerably more limited scale of CM testing at UTTR, the impacts considered below have been evaluated qualitatively. During evaluation of impacts from CM testing at UTTR, no impact was identified that warranted more quantitative consideration.

Impacts of CM tests on environmental resources may be categorized into air impacts, ground–surface impacts, and below–ground impacts. These are discussed below and summarized on Tables 4.0-1 and 4.0-2. When reading this discussion, it should be kept in mind that not all areas of UTTR are used equally for CM test activities. The missiles themselves follow a carefully prescribed route to a target or landing site. The two active chase aircraft, since they must keep visual contact with the missile, follow essentially the same route. The electronic surveillance aircraft remains at such a high altitude, that even though it may be anywhere within the UTTR airspace, it is far removed from potential receptors of its impacts. Similarly, the tanker is at considerable altitude and the inactive chase aircraft are shuttling between the missile track and the tanker. Also, on DoD ground, test targets must generally be constructed in areas that are accessible by ground vehicle and have access to power, fiber–optic cables and other support infrastructure. Thus, although test missions may theoretically result in air impacts throughout UTTR and in ground–surface and below–ground impacts anywhere on DoD ground, such impacts actually occur on specified approach routes and on or near targets and approaches to targets, barring a mishap. Therefore, there are many locations on UTTR where impacts to environmental resources from CM tests will never occur. Conversely, there are a number of areas where impacts are continually ongoing.

The Proposed Action (baseline case) and alternatives evaluated for this CM environmental assessment differ primarily in the number of annual CM tests assumed: six to eight for the Proposed Action, ten to twelve for Alternative 1, and two to three for Alternative 2. Thus, CM specific impacts of all types from Alternative 1 would be about two times the impacts from the Proposed Action, while impacts from Alternative 2 would be less than half.

However, when a CM test is scheduled, the level of spatial and temporal South Range airspace use may be markedly reduced. Under the Proposed Action, one CM test occurs every 1.7 months (assuming 7 individual tests per 12 months) and when a test is planned, the 388 RANS blocks out the entire South Range airspace on its long term schedule, often for an entire week to ensure that the climatic conditions appropriate to the test will be available. However, when the 388 RANS does the final schedule, they may tentatively schedule other activities in the South Range airspace and move to the North Range when the CM test actually happens, although late notice makes this more difficult (Munson 1998). Thus, the average of one sortie per 406 square miles per day (assuming 15,000 annual sorties or an average of 41 daily sorties in 16,651 square miles of airspace) during normal training activities (which results in 17 daily sorties in the 7,068 square miles of the South Range Restricted airspace and 14 daily sorties in the 5344 square miles of the South Range MOAs) does not occur while the one CM test scheduled for the week is being completed or tentative scheduling is being finalized. The average temporal distribution of one sortie per 65 minutes in the RAs and one sortie per 48 minutes in the MOAs during normal training activities (assuming operations in the RAs are continuous, while operations in the MOAs are between 5 AM and 8 PM Mountain Standard Time and that 54% of operations are in the RAs and 46% in the MOAs based on their acreages) would be diminished to about seven aircraft plus the CM for at least part of the CM test week.

For the Proposed Action and alternatives, the various types of air, ground–surface, and below–ground impacts are discussed below. Few of the impacts are quantified because they are such a marked diminution of typical daily activity and are generally not at all substantive.

4.1 AIR IMPACTS

Potential air impacts include degradation of ambient air quality, increased noise levels, intrusion into visual resources, and physical impacts. Above minimum altitudes, air impacts from CM tests tend to be focused along the track of the missile and its chase planes, in the vicinity of the racetracks occupied by the tanker and surveillance aircraft, and between the missile track and the tanker racetrack as chase plane pairs trade off between active visual tracking and refueling. Air impacts tend to be transitory and leave behind no lasting alteration of the environment.

4.1.1 Air Quality Impacts

Degradation of ambient air quality may result from aircraft or CM emissions during flight or from CM detonation during testing. Range maintenance and cleanup may also degrade ambient air quality from detonation of unexploded munitions or the release of particulates into the air during the operation of cleanup equipment. High altitude air pollutants from the delivery, surveillance, and tanker aircraft are expected to be widely and rapidly dispersed. Even though low–level air pollutants from the CM engines and chase planes will be focused along the missile track, they are also expected to be widely and rapidly dispersed, given the low overall spatial and temporal densities of air vehicles during CM tests.

If a mishap were to occur, air quality impacts might increase slightly, especially if there were a fire in association with a crash. The fire itself would cause an increase in airborne chemicals and particulates, as would rapidly responding ground and air vehicles from their exhaust and particulate dispersal.

4.1.2 Noise Impacts

The effects of aircraft noise result from a complex interrelationship among numerous factors, only some of which are related to the physical characteristics of the noise itself. In general, these may be categorized as impacts on people, impacts on structures, and impacts on wildlife.

Noise levels of about 60 to 70 SEL from normal training activities have been generally documented at the South Range RA boundaries (Booz·Allen & Hamilton and Enviro-Support, Inc. 1999). The impacts of CM testing are markedly lower than this, given the substantial reduction in the number of aircraft using the South Range airspace. Supersonic flight and resultant sonic booms are not associated with CM testing.

The missile itself does not generate a noise signature comparable to current generation tactical aircraft. Its Williams F-107 turbofan engine generates less than 1000 lbs. thrust as compared to more than 23,000 for the engine in the F-16. The CM engine does not have an afterburner, and power transients are small.

If a mishap were to occur, noise impacts might briefly increase, especially if a crash were involved. Responding air and ground vehicles might also increase transitory noise levels.

4.1.2.1 Impacts on People

Of the potential impacts on people, only social/cultural effects are associated with the noise levels occurring at UTTR. The social/cultural effects of aircraft noise include the startling of receptors, causing interruption or error in tasks involving fine motor skills, objects to be dropped, or fright; interference with the broad range of everyday human activities, such as family and telephone conversations, listening to the television or radio, studying, and simple relaxation; and disruption of sleep. Interference with normal voice levels of about 55 to 60 dB begins to occur when SELs exceed 65 dB (U.S. Department of the Air Force 1996) and may last beyond the interruption for the time it takes to reestablish concentration. Sleep interference may result from a maximum A-weighted level of 55 dB, which can cause about 5% arousal from or shift in sleep stage when it lasts 10 seconds (Kryter 1984). An Ldn of 45 dB protects against sleep interference and is provided by the 65dB outdoor standard if a very conservative structural noise insulation of 20 dB is assumed; further, an indoor SEL of 65dB should awaken less than 5 percent of those exposed, even without habituation having occurred (U.S. Department of the Air Force 1996).

Following any initial startle effect, interruption, or awakening, the most commonly observed effect of noise on people is the stimulation of annoyance, a summary measure of the general adverse reactions to noise that interferes with social/cultural activities as noted above. Worldwide social surveys have found that, while the response to individual events varies considerably, the reported annoyance is closely related to the long-term exposure to noise; 65 dB L_{dn} is the point at which 14 percent of the population starts to be highly annoyed (Workman et al. 1992). An Ldn of 65dB is typically used as the threshold of community noise annoyance for airport environmental assessments (U.S. Department of the Air Force 1996). Note that thunder from lightning strikes 0.6 miles away produces noise of 134 dB (U.S. Department of Transportation 1992).

The background noise level and the attitudes of people toward noise are actually more important in determining their negative reactions to noise than the noise exposure level. The age (and associated hearing range) of the people impacted, as well as their familiarity with and understanding of the purpose and process of Air Force activities can also play a large role in influencing their response to intrusive noise. Nonetheless, the unique characteristics of individuals make it virtually impossible to accurately predict how any one person will react to a noise event.

4.1.2.2 Impacts On Structures

Individual aircraft flyovers may induce structural vibrations; the secondary rattle of hanging pictures, window panes, and bric-a-brac; and may cause residents to fear damage to their possessions. In the case of historical structures, noise-induced structural vibrations can be a concern insofar as they may damage aged structural materials. However, the noise levels produced by normal training activity at UTTR (60 to 70 dB at the RA boundaries) are far below the levels likely to cause structural damage. The noise levels from CM tests are lower still.

For example, the vibration level caused by departing Boeing 727 aircraft, with maximum A-weighted levels of over 95 dB at the measurement locations, was judged to be an order of magnitude or more below the criteria for housing damage (Broner 1994). A study of the probability of glass breakage from various overpressures when all flight paths were equally likely relative to the plane of a window was 1 in a million from 1 psf (1 psf equals a C–weighted sound exposure level (CSEL) of 101.6 dB) (Unknown, n.d.). Aircraft–induced vibrations from Concorde takeoffs and landings on a runway 1,500 feet from a historic home were less than those associated with touring groups (their footsteps and closing of interior doors) and vacuuming within the home (Wesler 1977).

4.1.2.3 Impacts on Wildlife

The impacts of noise on wildlife both resemble and differ from the impacts of noise on people. In general, the differences are because wildlife species have a wide diversity of adaptations for using sound in their daily lives, because wildlife species may tend to suffer more from physiological than psychological stress, and because many wildlife species tend to be more behaviorally "hard–wired" than humans, which requires them to complete certain behaviors from the beginning and in tune with seasonal rhythms.

Social/cultural effects of noise on wildlife include factors such as startle effects, communication interruption, and sleep interruption, just as they do for humans. In addition, wildlife behavior patterns may be disrupted. Startle effects in wildlife may result in escape behavior such as running, crowding, taking flight, or hiding. Behavioral responses of mammals vary among species and individuals and with the type of activity, the size of the group, and the time of year. For example, caribou crossing rivers, in larger groups, in terrain with no cover, and/or during the calving tend to react more strongly to noise than when they are in less vulnerable situations. Behavioral responses of birds also vary among species, depend on aircraft type, and responses observed range from turning the head, to extreme agitation and flocking behavior, to preferentially hunting near bombing target for small mammals displaced by the bombing (Manci et al. 1987). Whether such behavioral responses are detrimental to individual animals (and ultimately to populations) depends in large part on whether they occur in concert with other stressors and result in health effects. Similarly, interruption of sleeping wildlife could be detrimental because it would increase the stress load on and energy consumption of individuals that may already be subject to other stressors. The interruption of communication among members of a species is primarily detrimental to those species for which successful breeding behavior or predator escape is heavily dependent on sound.

Several factors must be kept in mind when considering wildlife health effects from exposure to noise. These factors include:

- The differences between people and wildlife in the noise frequencies heard and emphasized
- The variability among wildlife species in the noise frequencies heard and emphasized
- The greater exposure of wildlife species to the vicissitudes of the natural world and thus to physiological stressors from which most people are isolated.

4.1.3 Visual Resources

Impacts to visual resources are in part dependent on how they are perceived by receptors. Visual resource impacts tend to be perceived negatively when they occur in locations such as wilderness study areas (WSAs) where the observer is immersed in experiencing the natural environment. Impacts to visual resources from CM tests include:

- Exhaust plumes from aircraft and even the presence of aircraft in otherwise isolated, natural areas
- Smoke plumes from detonated munitions.

However, given the prescribed track followed by CMs and their chase planes and the high altitudes used by associated delivery, surveillance, and tanker aircraft, visual impacts of exhaust plumes from air vehicles associated with CM tests are minimal. Certainly they are less than the visual impacts from the normal training activities that occur in the South Range airspace. Normal levels of training activity result in 1 sortie over a MOA WSA only about once every 2.8 months and 1 sortie over an RA WSA only about every 4.6 months; 60% to 70% of these are below 10,000 AGL. Further, most of the land within the WSA boundaries is high terrain and more likely to be subject to low–altitude aircraft flights along its periphery than across its core. Nonetheless, aircraft approaches up Whirlwind, Tule, and especially Snake Valley are likely to be occasionally visible and audible from within these wilderness areas. These approaches are used during CM testing.

Munitions are detonated only on or above DoD ground and typically at targets toward the east side of the South Range–Army. Therefore, their smoke plumes are unlikely to be visible from any WSA except, perhaps, from higher elevations in the Cedar Mountains WSA.

If a mishap were to occur in association with CM testing, visual resource impacts would briefly increase, especially if a fire were involved. If the FTS were engaged during a mishap, the primary effect would be to redirect navigational systems, shut off fuel systems, and without specific impact. The ALCM FTS also includes a destabilizing parachute that might be visible. Dispersed particulates, especially from rapidly responding ground vehicles, might further diminish visual resource quality, but only temporarily.

4.1.4 Physical Impacts

The collision of aircraft with other objects in the air is also a potential air impact. Those objects might be other aircraft (military or civilian), but given the excellent communication systems maintained by the 388th RANS, the 299th RCS, and FAA, such collisions will not occur, barring a mishap. Birds and bats, however, have only their built in senses to warn them of rapidly approaching aircraft. For the most part, aircraft strikes of airborne wildlife kill individual animals, but do not damage their populations, nor are the aircraft damaged. Strikes that are detrimental to large numbers of birds and to aircraft can occur, however, during spring and fall when bird migration occurs. Particular problems may arise where large birds, such as raptors, are funneled by topography so their concentrations are high along a narrow corridor or where large birds, such as waterfowl, congregate in wetland staging areas from which they may arise en masse when startled. It should be noted that over the last 19 years (which is essentially the entire lifespan of CM testing) there have been no situations where chase aircraft have reported even near misses between CMs and flying birds (Banas 1998, Jugenitz 1998).

Given the low numbers of CM tests in the South Range airspace, the following of a prescribed route by the missile and its chase planes, and the visual tracking of the missile throughout its flight, physical impacts with participating air vehicles are extremely unlikely.

4.2 GROUND–SURFACE IMPACTS

Ground surface impacts may affect the largely transitory surface water (flow and quality), the wetlands, soil, vegetation and wildlife (including threatened and endangered species), and cultural resources (including paleontological, archeological and historical resources). In addition, they may result in the presence of hazardous waste or other spills or residues.

During normal CM tests, ground–surface impacts occur in localized areas on DoD ground. Such ground–surface impacts primarily result from detonation of the CM payload. Payloads may be detonated on the ground, or above the ground with a subsequent rain of debris. The degree to which the ground surface and the natural resources present on it are disrupted depends on the size of the charges and the weight of the payload. In addition to resources disturbed by direct impact, tremors from such direct impacts may startle wildlife, damage wildlife nests or burrows, or might affect cultural resources (e.g., a tremor may cause sloughing of cave walls containing petroglyphs), although the latter is unlikely (Kreusch 1998). However, given that CM tests typically use an established and well instrumented target, overall impacts from normal CM tests are expected to be minimal, localized, and focused.

Physical or chemical debris remaining after a munition has detonated is periodically removed during target maintenance and cleanup, categorized, and disposed. The depleted uranium that simulates the warhead used in the ALCM and ACM, while of particular public interest, is very unlikely to cause harm. It primarily emits alpha particles, which are blocked by skin. It also emits some beta particles, which are blocked by clothing and similar materials, and very small amounts of gamma radiation, which is highly penetrating. The primary health hazard of depleted uranium occurs because of its heavy metal toxicity when it is internalized. Because of this, the personnel retrieving any depleted uranium from an impact site follow protocols outlined in the operational safety plan. One of the goals of rapid Air Force response to any ALCM or ACM mishap occurring outside DoD ground would be to prevent inhalation or ingestion of depleted uranium by onlookers, although such seems highly unlikely.

The siting and construction of new missile targets or the expansion of existing targets may also cause disturbance to the ground or natural resources from clearing an area for a target. Finally, disturbance of the ground surface may result from installation of support facilities, such as fiber–optic cables, Cine-Ts, and access roads. These ground disturbances may permanently alter local surface drainage and remove wetlands, vegetation, wildlife, and cultural resources from small areas. Further, wildlife may be displaced from areas of temporary activity and the ecosystem altered to the extent its components (e.g., drainage, vegetation) are altered. Thus, for example, even temporary activity may result in changes in the wildlife in an area because the temporary activities have altered wildlife habitat or occurred at critical periods in a breeding cycle.

During mishaps associated with a CM test, the primary potential ground–surface impacts are fire and surface disturbance at undesignated landing or crash locations, and surface disturbance from ground vehicles traveling cross country to the emergency location. Under such circumstances, the surface water, soil and vegetation of sensitive habitats may be disturbed. The extent of the damage from fire, depends on the location, since certain vegetation types on UTTR are more susceptible to burning than others (Figure 4.2-1); greater densities of vegetation, size of susceptible plant cover polygons, and slope all contribute to the propensity of a specific location to burn (Edmonds 1998, Sheffey 1998). For example, there is low fire danger in aspen, mountain and lowland riparian, wet meadow, and wetland cover types, moderate fire danger in ponderosa pine, grassland, alpine, dry meadow, and desert grassland cover types, high fire danger in most shrub cover types, and extreme fire danger in most conifer cover types. If such fire disturbance were extensive, this would of course negatively impact the wildlife and people that live within these habitats. However, CMs are required by Air Force Instruction (AFI) 13-212—Supplement 1 (388th Range Squadron 1998) to have a profile that can be accommodated safely within UTTR land boundaries or that avoids manned/inhabited areas unless it can be verified that the risk of death per mission is equal to or less than 30 in 1 million for non–participants, unless it is equipped with an approved FTS. Thus, extensive damage off UTTR lands is highly unlikely.

The extent of the damage from surface disturbance at undesignated landing or crash locations depends largely on the awareness of the emergency response team to sensitivity of the ecosystem(s) they are traversing. To the extent that sensitive or unique habitats (e.g., wetlands, wooded areas) are avoided when approaching an undesignated location or removing debris from it, damage is minimized. Minimizing the number of trips to such a location, use of large under–inflated tires, and careful selecting of the ingress and egress route to avoid crushing woody vegetation further minimize damage. Finally, even if the missile malfunctions, there may be some control of the landing site because CMs operating beyond UTTR land boundaries are required to have an RCC/FTS. RCC allows test personnel to take control of the missile and fly it around airborne obstacles or to a selected location for termination. FTS is required to and designed to eliminate thrust and lift, as follows: All three missiles cut off fuel to the engine to eliminate thrust. ALCM and CALCM use a parachute to eliminate lift and ACM executes a hard–over turn that destabilizes the missile and eliminates lift. An ACM involved in a December 1997 mishap was equipped with an RCC/FTS. However, the missile, which had flown for 3.5 hours and completed all its test objectives, inadvertently damaged two unoccupied trailers that were part of a cosmic ray observatory when it impacted the ground. The damage resulted because three things occurred simultaneously: the University of Utah was allowed to place an observatory belonging to the University of Tokyo in an area reserved for hazardous test operations; mission planners were unaware of the existence of the observatory; and the communications suite for controlling the missile was not configured to do what test personnel expected it to do (ACC 1998). This series of events certainly resulted in ground–surface impacts, but is most unlikely to reoccur.

4.3 BELOW–GROUND IMPACTS

The causes and specific types of below–ground impacts are very similar to those of ground–surface impacts except that they result from particularly large munitions that may affect rock formations and mineral resources as well as deeper soils, and affect groundwater rather than surface water. Below–ground impacts may also directly impact natural, paleontological or archeological resources, indirectly affect these resources through vibration, fire, or displacement, as well as result in the contamination of natural resources by generating hazardous wastes or other spills or residues. Below–ground impacts are expected to be markedly fewer than ground–surface impacts and be even more focused on established targets. This is because only a small proportion of munitions are sufficiently large to cause below–ground impacts, and these are all used at established targets, barring mishaps. The payload of the CMs tested at UTTR is unlikely to result in below–ground impacts.

5.0 OTHER CONSIDERATIONS

5.1 IMPLICATIONS OF IMPACTS

5.1.1 Socioeconomic Implications of Various Alternatives and Their Impacts

CM testing in the South Range airspace primarily uses support aircraft from elsewhere. Typically seven aircraft are involved (two pairs of chase planes, a delivery plane, a tanker, and a surveillance plane). Tests schedule substantial blocks of time during which training activities, the primary mission of UTTR, cannot be scheduled in the South Range airspace. CM tests also require sophisticated and costly electronic surveillance, monitoring, and measuring equipment. Given these characteristics, even with the minimal impacts from Alternative 1, the most extensive CM test program, it might seem that Alternative 4, which assumes no CM testing, would be most advantageous. However, there are a number of highly important benefits from the CM test program.

The general benefits from the CM test program include the following:

- The CM test program ensures that stockpiled weapons are viable and effective by sampling them using a stratified random protocol
- It provides experience in all phases of CM delivery from selecting the missile, to loading it on the delivery aircraft, to launching it, and accurately delivering it to the target. The performance of people, hardware, and software are all evaluated.

The use of UTTR for the CM test program results in the following benefits to the test program and to UTTR, specifically:

- UTTR provides exceptionally appropriate topography for CM tests, having both highly varied topography and large flat expanses where different aspects of the missile's guidance system can be tested
- Even though testing of CMs does not involve Hill AFB aircraft, it uses a disproportionate amount of air time relative to the numbers of aircraft and pilots to which it provides experience, and disrupts the primary training of UTTR, CM and other testing contribute significantly to the UTTR budget. Projections of customer earnings for FY 1999 through FY 2003 are between $5,566,000 and $6,738,000, with most of the projected earnings coming from weapons (46%) and CM (46%) testing (Wheatley 1998). Training, the primary mission of UTTR under ACC, is projected to contribute much smaller earnings (2%) from customer use.
- The test programs typically fund the maintenance of state–of–the–art electronics to provide highly accurate data on their tests. Much of this equipment can then contribute toward cutting edge training experiences as well.
- The training that is so important to overall Air Force readiness and excellence is thus strongly supported by test programs.

CM testing, therefore, which has very few negative environmental impacts (Section 4), has no negative impacts on such socioeconomic components as transportation and services, and has strong positive impacts on UTTR, Hill AFB and Wasatch Front economy.

5.1.2 Environmental Justice

The minor impacts from CM testing occur primarily at high (>18,000 feet AMSL) altitude (tanker and surveillance aircraft), at decreasing altitudes approaching 10,000 feet AMSL as the missile is launched and followed in the air by chase planes, and at developed targets in the eastern–central portion of DoD ground. The missiles are typically launched at about 10,000 to 12,000 feet AMSL west of Granite Mountain on DPG, and descend to terrain following altitudes after launch. Thus, the most likely areas for humans and wildlife to be impacted are in the south end and west side of the airspace as the delivery aircraft circles south–southwest down the boundary of Sevier B, and turns clockwise up Whirlwind, Tule, or (most likely) Snake Valley en route to the launch box and selected target. Nonetheless, the aircraft are at rather high altitudes while in the MOAs.

The low human population in the West Desert means that very few people are potentially impacted by the CM test program. The 1990 data for the West Juab Division census block reveal an ethnic composition of 73.8 percent Caucasian, 18.8 percent Native American, and 7.9 percent Hispanic. These ethnic groups are generally dispersed. Although Native Americans are concentrated on the west side of the Deep Creek Range and in Skull Valley, neither of these areas receives disproportionate use by the CM test program. Thus, an evaluation of the degree to which impacts are incurred by protected classes (including minority and economically disadvantaged groups) as required by Executive Order 12898, shows that none of the minority ethnic groups is disproportionately impacted and the CM test program is in conformity with environmental justice policy.

5.2 POTENTIAL MITIGATION MEASURES

Most impacts from CM tests are influenced by the number of tests per year. Ways to potentially mitigate these impacts, even though they are minor, are discussed below. It should be noted that not all of these potential mitigation measures can be employed simultaneously since some contravene each other. Thus, possible tradeoffs must be evaluated among mitigation measures as well as between mitigation and mission efficacy.

5.2.1 Air Impact Mitigation

Air impacts increase as the number of tests increases. Air impacts are also influenced by meteorological parameters and the season, time of day, altitude, location, and attitude of aircraft flight. The air quality, noise, visual, and physical impacts mentioned below are associated with CM testing but to a very limited degree because of the small number of tests and the limited number of aircraft associated with each test. Nonetheless, the impacts discussed below should continue to be kept in mind so as to minimize impacts as a matter of practice.

Although air quality impacts will increase with the number of tests and dispersion of air pollutants may be inhibited by such conditions as temperature inversions and stalled pressure areas (or encouraged by high winds), air quality impacts from CM tests are minimal because of the large area available to each test and the low number of tests conducted annually. Nonetheless, continued care should be taken to:

- Maximize the efficiency of fuel burning

- Minimize the aerial dumping of fuel (which may occur at an altitude and pattern defined by Clover Control).

Aircraft noise increases as speed increases. However, at a given speed, the amount and dispersal of noise are highly variable and depend on temperature and cloud cover, which affect air density and the presence of reflective surfaces in the air, and on the attitude of the airplane relative to reflective surfaces in the air. Also, because the degree of noise impact is in part dependent on how it is perceived by receptors (people and wildlife), the altitude and location of the noise are factors influencing noise impacts. The lower the aircraft, the more likely its noise is to be negatively perceived by receptors on the ground. Also, airplane noise over wilderness areas, wildlife refuges, or homes has a greater perceived impact than noise over industrial areas. Similarly, airplane noise over nesting or other birthing areas for wildlife is more detrimental than noise in open foraging areas. To minimize such impacts, the following potential mitigation measures should be employed whenever possible without compromising a CM mission's effectiveness:

- Avoid manned areas in the missile flight profile, exclude manned areas from the maximum energy footprint of the test mission unless a risk of less than 30 per million can be assured, and even with an FTS, keep missiles a horizontal distance of at least one nautical mile from manned areas when they are below 6,000 feet AGL (as currently required by AFI 13-212, Supplement 1; 388th Range Squadron 1998)
- Avoid flight below 3,000 feet AGL over populated areas by a horizontal distance of 0.5 nautical miles from the highest point and over the entire Fish Springs NWR area; in addition avoid UAV flight over the Fish Springs NWR area (as currently required by AFI 13-212, Supplement 1; 388th Range Squadron 1998)
- Minimize activities during spring and early summer birthing periods for wildlife and livestock, specific dates of local cattle drives, and nighttime or early morning for local residents, to the extent such scheduling does not impede the effectiveness of the overall CM test program
- Consider increasing communication with residents of land beneath the UTTR by using the web page and email and/or an educational outreach program to increase positive interest in and understanding of Air Force operations at UTTR.

Impacts to visual resources are also affected by meteorological conditions. However, in this case cloud cover (as well as darkness) may obscure aircraft that otherwise might be perceived as a visual intrusion. Thus, impacts to visual resources might be minimized by flying at night or during cloud cover—both situations that tend to increase noise impacts and lessen the effectiveness of visual observation as a safety measure and in test management. For most residents, recreational users, and wildlife, minimizing noise impacts would take precedence. Further, because of the requirement that all CM tests except CALCMs be followed visually by chase aircraft, CM tests cannot be conducted when there is greater than three–eighths cloud cover or at night.

Direct physical impacts such as bird strikes can be avoided by minimizing flights in the vicinity of the Goshute Mountains along the western border of the North Range airspace and the Fish Springs Wildlife Refuge on the east side of the Fish Springs Range just south of DPG during the spring and especially during the fall. These are the locations where and seasons when large numbers of birds are most likely to be present. Typical CM flight profiles currently avoid these areas, although the tanker racetrack set up at high altitude along the western edge of the UTTR airspace is typically in the vicinity of the Goshute Mountains.

5.2.2 Ground–Surface Impact Mitigation

Ground–surface impacts will be minimally influenced by the number of CM tests, so long as existing targets continue to be used. This assumes that procedures already in place for waste and disturbance minimization, prescribed in the NEPA documents prepared to evaluate those sites, are adhered to closely. Any debris not recovered under these procedures will tend to increase with increased target use. Ground–surface impacts will increase as the number of ground targets increases.

The most significant ground–surface impacts are the construction of new targets or other facilities, fire, and disturbances during the breeding season for wildlife and livestock. It is assumed that any new targets will require site–specific evaluation under NEPA that is separate from this document. Fire and breeding season impacts may be influenced by the season as well as the number of CM tests. In particular, fire is more likely in the fall or at other times of dry weather than in the spring or at other times of wet weather. Further, fire is more likely in specific vegetation cover types, particularly shrub and conifer cover types. The young of most wildlife and livestock are hatched/born in the spring and early summer. Therefore, surface disturbance or activities are most detrimental at this time of year. The other season when wildlife are most vulnerable to surface disturbance or activities is late winter when pregnant mammals are most stressed by weather conditions and food shortages and when raptors are early in their breeding cycle and readily disrupted. Ground–surface impacts can be minimized by the following actions:

- Use of existing targets and other facilities without expanding them whenever possible
- Continued adherence to waste and disturbance minimization at existing targets and other facilities
- Scheduling of missile payload detonations during the more moist times of year, particularly when ground activity that might cause ruts in the soil will be absent
- Scheduling of ground disturbing activities to avoid the period between late winter and early summer when wildlife populations are most vulnerable
- Continued fine–tuning and adherence to IAGs with the USFS and especially the BLM regarding communication protocols and their implementation during airborne fire fighting activities
- Inclusion of environmental personnel in rapid response teams called to deal with mishaps and emergencies to minimize environmental degradation to the extent reasonable in the fray of rapid response.

5.2.3 Below–Ground Impact Mitigation

Below–ground impacts will be least influenced by the number of CM tests, since the activities that cause them are especially focused on existing targets. At these existing targets, protocols should already be in place for retrieval of wastes and debris. If there are residual items, these will tend to increase with increased use of targets, and could potentially find their way into groundwater. The quantity of such residual items from CM testing is expected to be small and their impacts insignificant.

5.3 IRREVERSIBLE/IRRETRIEVABLE COMMITMENT OF RESOURCES

The Proposed Action is the current baseline number of CM tests. Thus, it envisions no change from ongoing activities. The primary resources irreversibly/irretrievably committed by these activities are fuel for all air vehicles including the ALCM, CALCM, ACM, and munitions for the CALCM payload. For those CMs designed to carry nuclear warheads during actual combat use, depleted uranium is used as the test payload to simulate the weight of the actual warhead. Such missiles, which also carry JP–10 fuel and lithium and thermal batteries are retrieved from DoD ground by trained recovery teams. Minor amounts of fuel will also be expended by the ground vehicles of support personnel. Ongoing maintenance of aircraft, ground vehicles, and other support equipment including communications components will require replacement parts, and expendable supplies.

5.4 CUMULATIVE IMPACTS

This EA addresses the current CM test program at UTTR (Proposed Action—six to eight tests per year) as well as alternatives that represent variations in the total annual number of tests: Alternative 1 could require ten to12 tests, Alternative 2, a reduction to two or three tests; Alternative 3 would relocate these tests to another facility, and Alternative 4 would discontinue CM testing. The impacts from these tests are minimal and even noise, which is the primary CM impact, is lost against the background noise of daily training operations at UTTR[16]. During the time that CM tests are scheduled, there is actually a diminution of noise and most other ongoing impacts from use of UTTR. Thus, CM tests do not contribute substantively to cumulative impacts at UTTR.

[16] *The cruise missile test is, by comparison with other UTTR activity, high priority but low physical impact. Its operational impacts consist primarily of the displacement of other UTTR activity, which yields the noted overall reduction in noise on the range.*

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8.0 PERSONS CONTACTED AND KEY DISCUSSION TOPICS

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388th Range Squadron

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Lt. Col. Robert P. Vozzola, Commander (1999)

Mr. Richard Hadley

Mr. Doug Carter

Mr. Jim Banas

Mr. Mike Munson

Mr. G.E. Trainor

Mr. Ron Jugenitz

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OOALC/EMP

Ms. Kay Winn

Overview of EM responsibilities regarding the CM program.

Barksdale AFB, LA

49th Test and Evaluation Squadron

Maj. David Salomon

Maj. Joseph Cappello

CM test program planning and management activities.

2nd Operations Support Squadron

Maj. Les Navarro

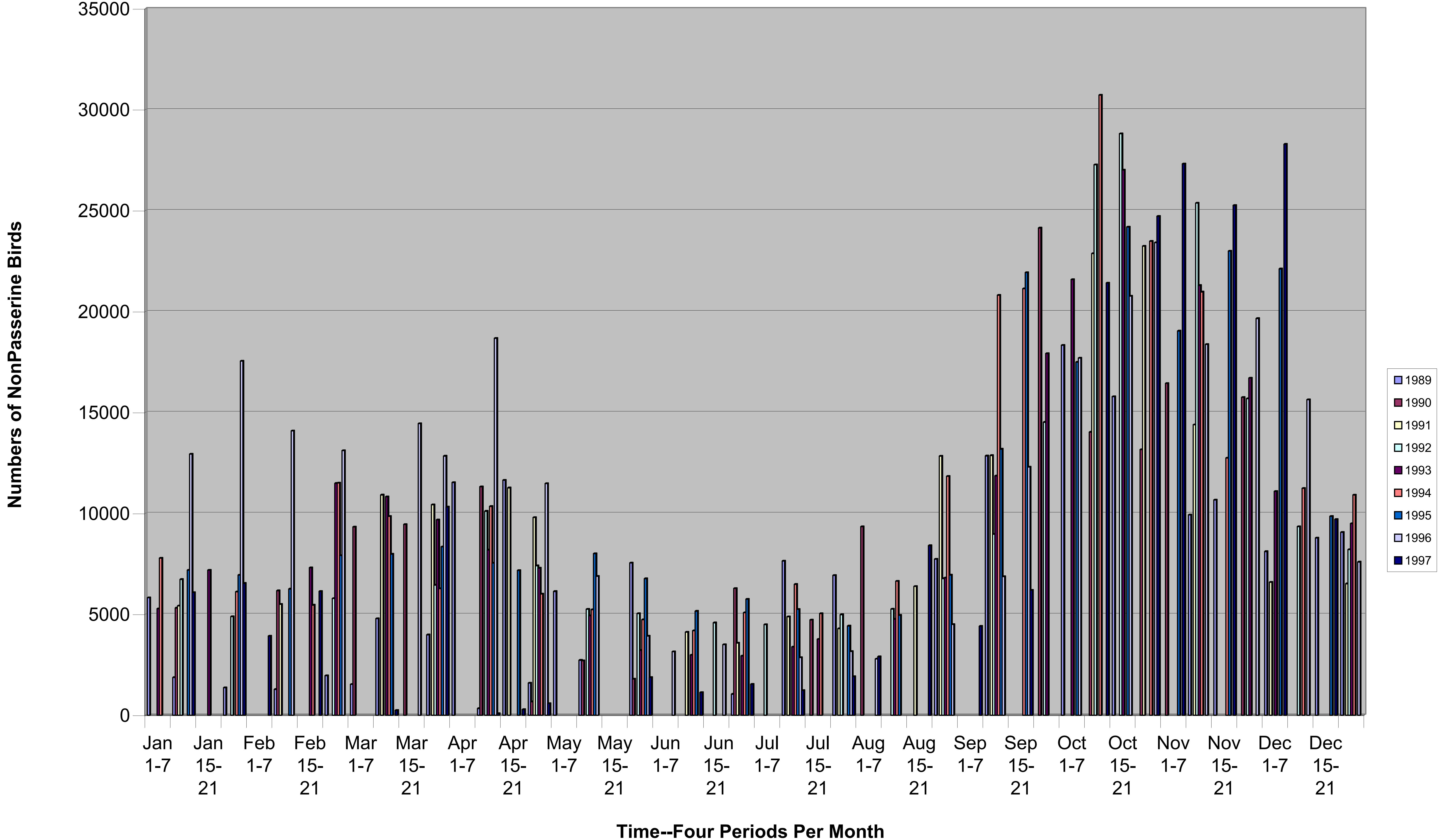
Unit planning and preparation

APPENDICES

APPENDIX A

TABLES AND FIGURES

Figure 3.4-1. Fish Springs National Wildlife Refuge--Seasonal and Annual Variation in Number of NonPasserine Birds.



Source: Gilbert 1998

Figure 3.4-2. Plant Cover Types on UTTR.

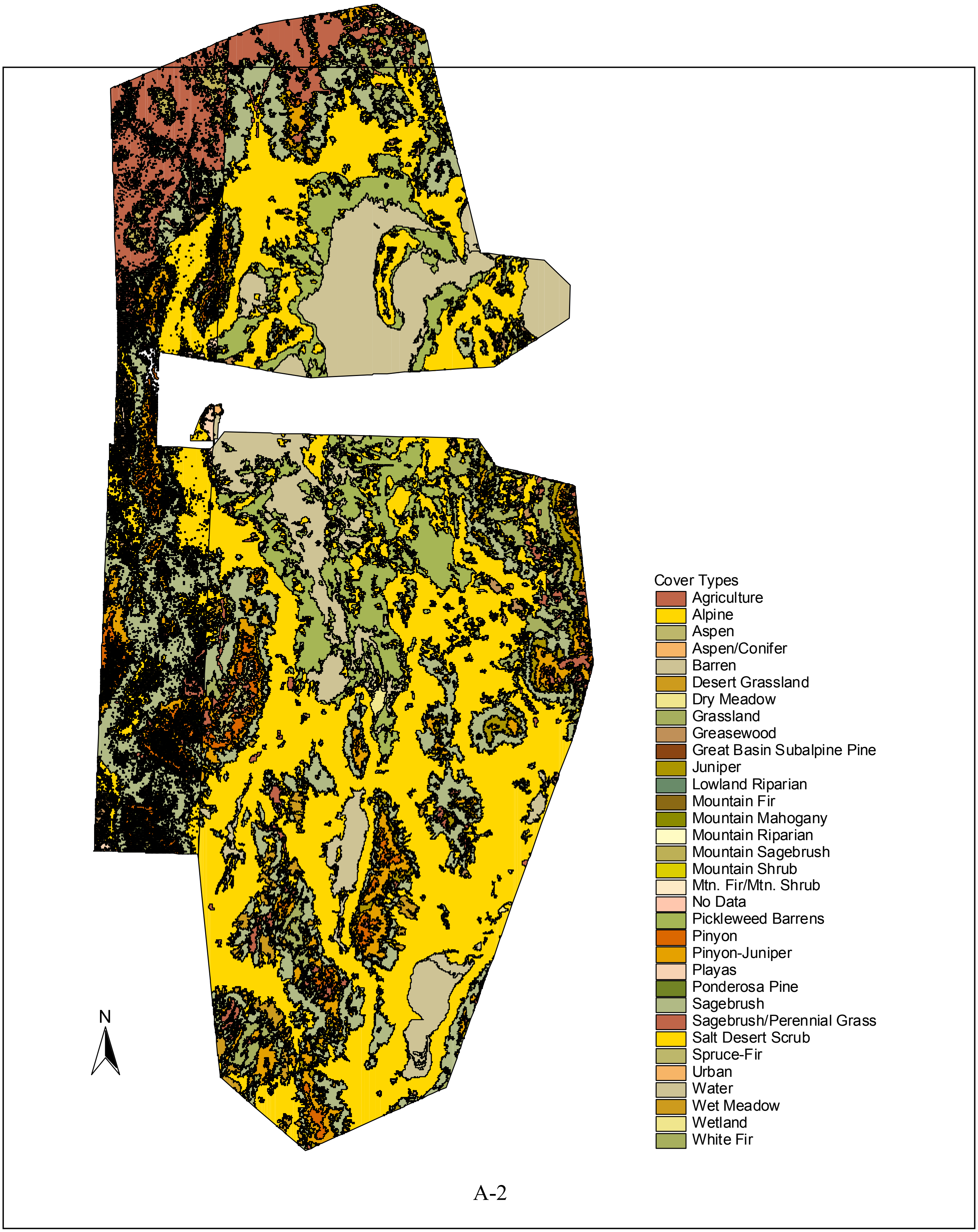


Figure 3.7-1. Wilderness Study Areas and Areas With Wilderness Character Nearest to UTTR Airspace.

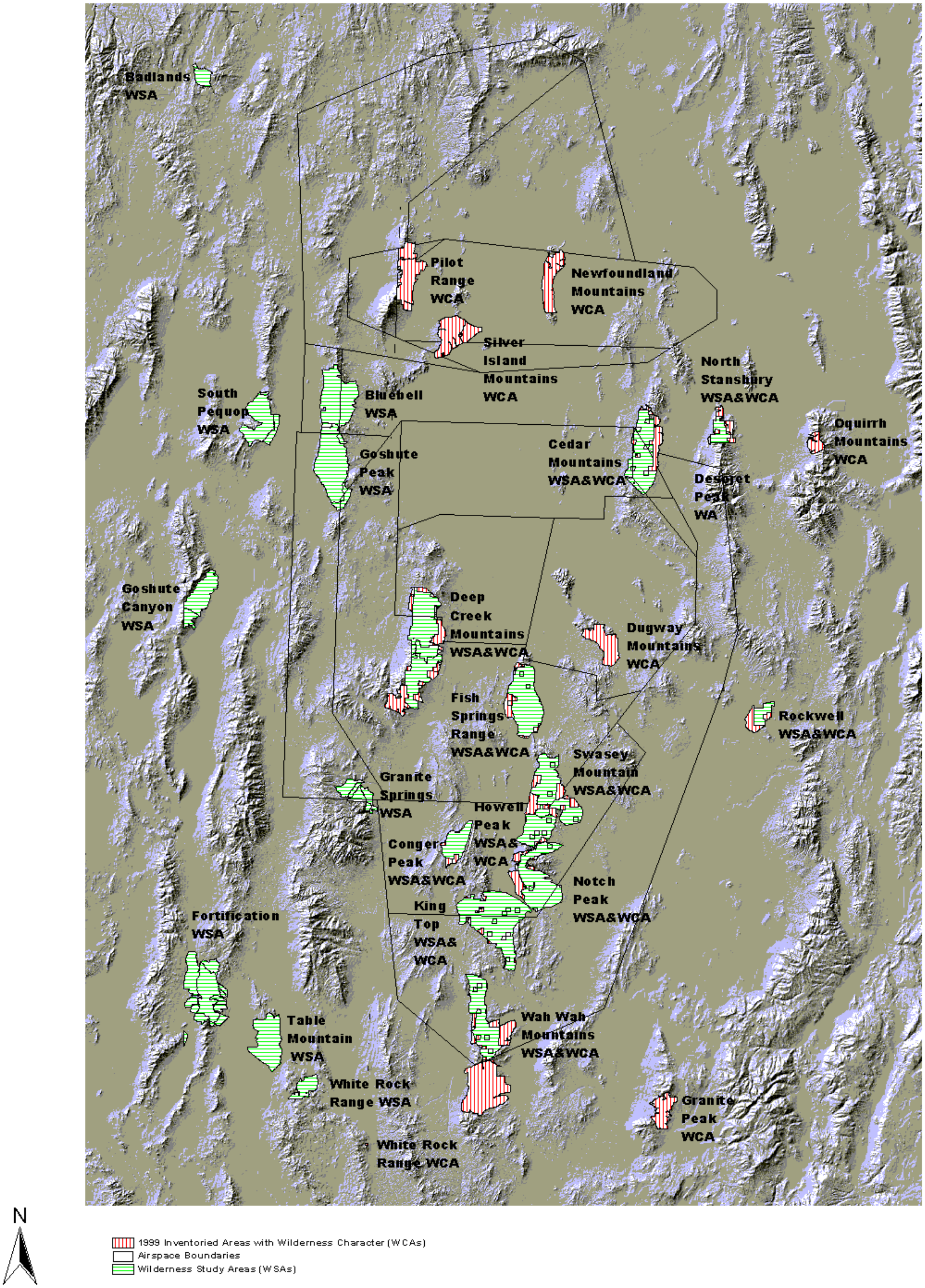
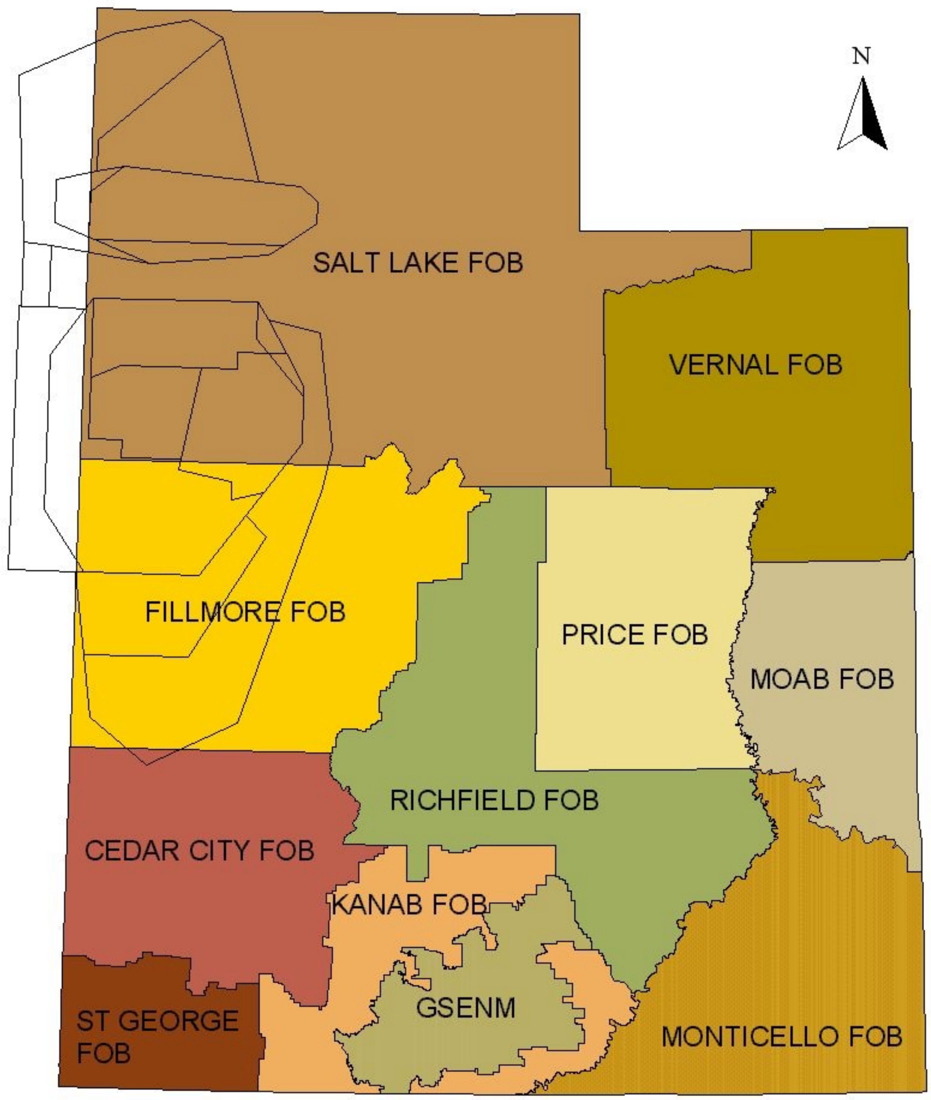


Figure 3.7-2 Utah BLM Field Office Areas of Responsibility



— = UTTR Airspace Boundaries
FOB = BLM Field Office Boundary
GSENM = Grand Staircase - Escalante National Monument

Figure 4.2-1 Fire Danger in Utah Based on Vegetation Type

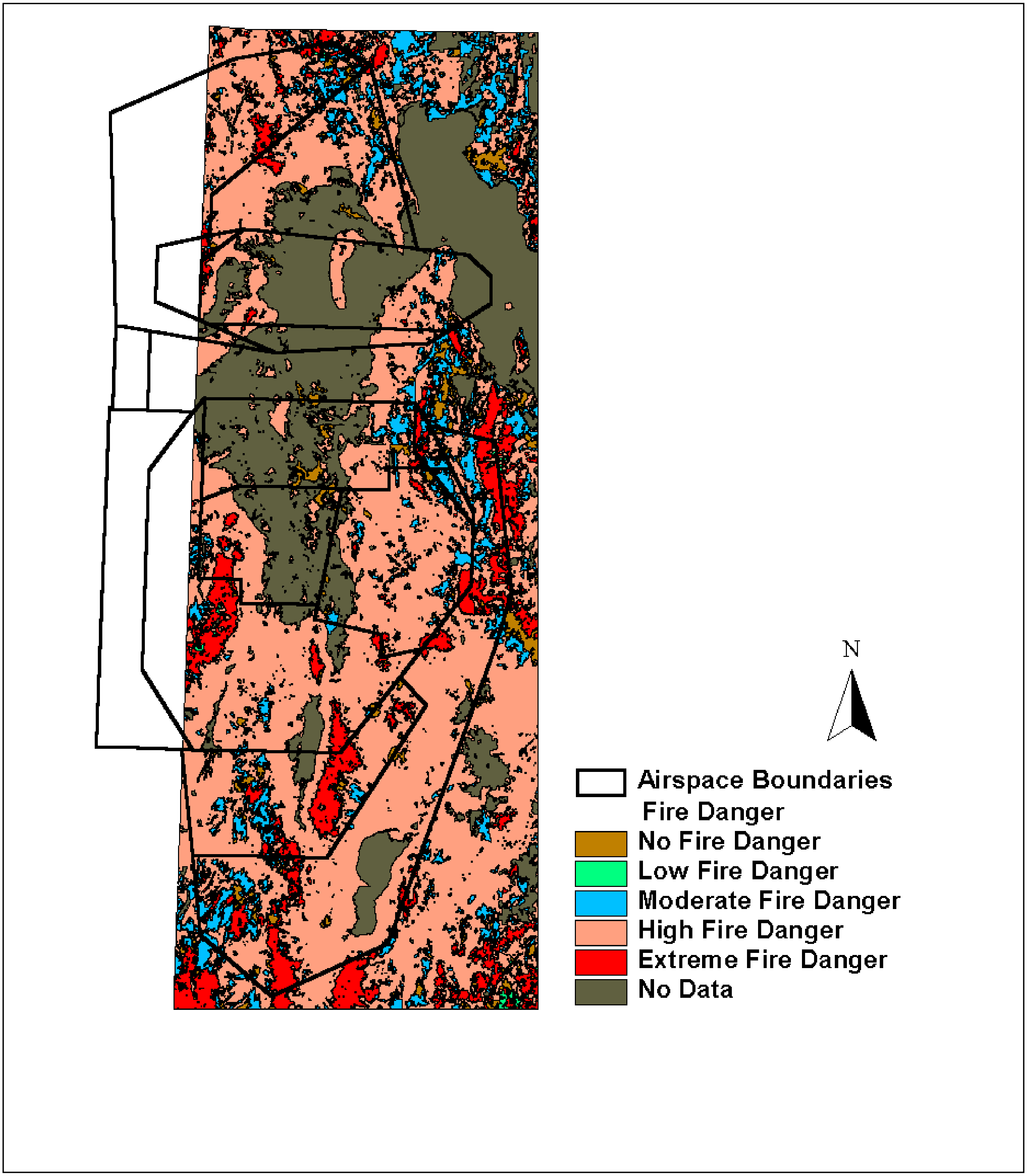


Table 3.4-1. Plant cover types, Number of Polygons, Acreage, and Percent Coverage on Individual DoD Land Parcels and DoD ground Overall.

	North Range Vegetation			South Range-Air Force Vegetation Utah and Nevada*			South Range-Army Vegetation			DoD Ground Overall			UTTR Overall*		
Plant Cover Types	Number of Polygons	Acreage	Percent	Number of Polygons	Acreage	Percent	Number of Polygons	Acreage	Percent	Number of Polygons	Acreage	Percent	Number of Polygons	Acreage	Percent
Agriculture							3	35.7	0.00%	3	35.7	0.00%	76	44,390.4	0.41%
Alpine (N)													14	32.0	0.00%
Aspen													572	13,203.6	0.12%
Aspen/Conifer													6	2,200.3	0.02%
Barren	21	118,270.0	32.06%	50	202,146.6	34.28%	54	124,020.8	15.50%	125	444,437.4	25.37%	1691	780,237.0	7.25%
Desert Grassland													93	131,251.9	1.22%
Dry Meadow													77	6,861.3	0.06%
Grassland	7	8,177.6	2.22%	7	4,635.5	0.79%	49	22,617.2	2.83%	63	35,430.2	2.02%	8106	490,334.8	4.56%
Greasewood	11	4,688.8	1.27%	223	2,169.4	0.37%	34	17,237.7	2.15%	268	24,095.9	1.38%	10253	177,595.3	1.65%
Great Basin Subalpine Pine (N)													995	3,523.4	0.03%
Juniper							14	3,077.2	0.38%	14	3,077.2	0.18%	5760	229,462.8	2.13%
Lowland Riparian				8	714.6	0.12%	7	524.3	0.07%	15	1,238.9	0.07%	71	6,266.1	0.06%
Mountain Fir													25	9,369.4	0.09%
Mtn. Fir/Mtn. Shrub													4	2,409.5	0.02%
Mtn. Mahogany													4274	24,710.4	0.23%
Mtn. Riparian													147	2,042.0	0.02%
Mtn. Sagebrush (N)													7943	104,188.3	0.97%
Mtn. Shrub													4048	26,893.4	0.25%
No Data				3	16.0					3	16.0	0.00%	55	175.7	0.00%
Pickleweed Barrens	22	53,063.0	14.38%	118	230,314.0	39.05%	68	293,610.9	36.70%	208	576,987.9	32.94%	221	943,042.6	8.77%
Pinyon													4993	201,109.4	1.87%
Pinyon-Juniper							8	2,924.5	0.37%	8	2,924.5	0.17%	13530	513,313.5	4.77%
Playas (N)				61	7,075.1	1.20%							836	17,054.0	0.16%
Ponderosa Pine (N)													37	135.0	0.00%
Sagebrush	6	2,439.8	0.66%	55	419.6	0.07%	18	21,669.8	2.71%	79	24,529.2	1.40%	19894	1,762,309.4	16.38%
Sagebrush/ Perennial Grass				5	10.0					5	10.0	0.00%	21737	764,827.4	7.11%
Salt Desert Scrub	18	80,665.7	21.87%	195	139,498.4	23.65%	93	314,100.5	39.26%	306	534,264.6	30.50%	13303	4,026,658.7	37.44%
Spruce-Fir													85	20,755.6	0.19%
Urban				5	1,615.9	0.27%				5	1,615.9	0.09%	4	624.2	0.01%
Water	4	101,585.3	27.54%							4	101,585.3	5.80%	60	422,034.6	3.92%
Wet Meadow													8	152.9	0.00%
Wetland				7	1,160.8	0.20%	3	221.8	0.03%	10	1,382.7	0.08%	15	14,382.2	0.13%
White Fir (N)													1734	14,643.4	0.14%
TOTALS	89.0	368,890.2	100.0%	737.0	589,775.9	100.0%	348.0	800,004.6	100.0%	1,113.0	1,751,595.6	100.0%	118,265.0	10,756,190.4	99.3%
Average Acres per Polygon		4,144.8			800.2			2,298.9			1,573.8			90.9	

Source: Edwards et al. 1995

(N) Within the UTTR airspace, this cover type occurs only in Nevada

*The Nevada GAP cover types data contained smaller polygons some different cover type names than used in the Utah GAP data. Similar cover types were combined to provide consistency in the map.

Table 3.4-2 Fall Migration of Raptors Past Goshute Peak in the Western UTTR Airspace.

Species	1983-1996 Mean Count	1997 Counts	Percent Change
Turkey Vulture	263	482	+83
Osprey	70	187	+167
Northern Harrier	155	255	+65
TOTAL OTHERS	488	924	+89
Sharp-shinned Hawk	4,245	4,677	+10
Cooper's Hawk	2999	3,848	+28
Northern Goshawk	129	97	-25
Unidentified accipiter	436	368	-16
TOTAL ACCIPITERS	7809	8,990	+15
Broad-winged Hawk	26	37	+42
Swainson's Hawk	182	143	-21
Red-tailed Hawk	2,729	2,922	+7
Ferruginous Hawk	16	18	+13
Rough-legged Hawk	13	10	-23
Unidentified buteo	88	77	-13
TOTAL BUTEOS	3054	3,207	+5
Golden Eagle	259	329	+27
Bald Eagle	13	6	-54
Unidentified eagle	1	0	—
TOTAL EAGLES	276	335	+23
American Kestrel	1,702	3,394	+99
Merlin	32	78	+144
Prairie Falcon	28	48	+71
Peregrine Falcon	6	29	+383
Unidentified falcon	9	7	-22
TOTAL FALCONS	1,777	3,556	+100
Unidentified raptor	158	102	-35
GRAND TOTAL	13,561	17,114	+26

Source: Jewell et al. 1998.

Table 3.4-3 Plant Species of Concern Listed as Relevant to UTTR by Utah State University (USU)*

Plant Species of Concern Known Within UTTR or Bufffer Zone	Current Threatened & Endangered Status	Status per Cited Source**
Spiranthes diluvialis[1]	**LT**	LT, CE (Nevada), G2SH, S1 (Utah)
Frasera gypsicola		C2, CE# S1(Nevada), G1, S1 (Utah)
Collomia renacta		C2, S1 (Nevada), G1Q
Viola lithion		C2, S1 (Utah), S1(Nevada), G1
Erigeron latus		C2, S1(Nevada), G3
Arabis falcatoria		C2, S1(Utah), G1
Draba kassii		C2, S1(Utah), G1
Eriogonum soredium		C2, S1(Utah), G1
Lepidium ostleri		C2, S1(Utah), G1
Penstemon idahoensis		C2, S1(Utah), G1
Potentilla cottamii		C2, S1(Utah), G1
Primula domensis		C2, S1(Utah), G1
Trifolium andersonii var. friscanum		C2, S1(Utah), G1
Hackelia ibapensis		C2, S1(Utah), G1Q
Astragalus anserinus		C2, S1(Utah), G2
Epilobium nevadense		C2, S1(Utah), G2
Jamesia tetrapetala		C2, S1(Utah), G2
Astragalus lentiginosus var. pohlii		C2, S1(Utah), G5T1
Eriogonum nummulare var. ammophilum		C2, S1(Utah), G4T1
Astragalus uncialis		C2, S2(Utah), G2
Cryptantha compacta		C2, S2(Utah), G2
Penstemon angustifolius var. dulcis		C2, S2(Utah), G5T2
Penstemon concinnus		C2, S3(Utah), G3
Sphaeralcea caespitosa		C2, S3(Utah), G3

Possible Additions to the Above List (July 1996)	Current Threatened & Endangered Status	Status per Cited Source**
Castilleja christii		
Astragalus callithrix		3C, S2(Utah), G3
Eriogonum spathulatum var. natum, 43 mi SW Delta		3C, S2, G3T2
Opuntia pulchella		3C, S2, G4
Eriogonum batemanii var eremicum		3C, S2, G4?T2
Penstemon leonardii var patricus, widespread in Deep Creeks		3C, S2, G4G5T2
Penstemon nanus		3C, S3, G3
Cuscuta warneri, (possibly extinct) on Lippia, near Flowells,		C2, SH, G5TH
Astragalus diversifolius, Juab, Tooele, saline meadows		S1 (Utah), G3
Asplenium viride, high elev. in Deep Creeks,		S1 (Utah, G4
Ivesia shockleyi var ostleri, Beaver Co., Wah Wahs, quartzite		S1, G3
Draba douglassii		S1, G4
Solidago spectabilis, saline seeps, Millard and Wash Cos.		S1, G4
Sisyrinchium douglasii, Tooele Co., Stockton Bar		S1, G4
Townsendia scapigera, Box Elder, Millard		S1, G4
Haplopappus racemosa, Cache, Millard, Utah Cos., saline meadow)		S1, G4

Possible Additions to the Above List (July 1996)—continued	Current Threatened & Endangered Status	Status per Cited Source**
Euphorbia exstipulata		S1, G5
Potentilla pensylvanica var paucijuga, central UT		S1, S2
Draba ramulosa		S1,G1
Draba globosa		S2, G3
Jamesia americana var macrocalyx, W. Juab Co, etc.		S2, G5
Balsamorhiza incana		SH, G4

Plant Species of Concern Known Near UTTR	Current Threatened & Endangered Status	Status per Cited Source**
Townsendia aprica	**LT**	LT, S1(Utah)G1
Sclerocactus wrightiae	**LE**	LE, S1(Utah), G1
Allium passeyi		
Sphaeromeria diversifolia (Utah)		
Primula capillaris		C2, CE, S1(Nevada), G1
Arabis falcifructa		C2, S1(Nevada), G1
Eriogonum holmgrenii		C2, S1(Nevada), G1
Phacelia minutissima		C2, S1(Nevada), G1
Primula nevadensis		C2, S1(Nevada), G1
Antennaria arcuata		C2, S1(Nevada), G2
Phacelia parishii		C2, S1(Nevada), G2
Aster kingii var. barnebyana		C2, S1(Utah), G3T1
Atriplex canescens var. gigantea		C2, S1(Utah), G5T1
Astragalus tephrodes var. eurylobus		C2, S2(Nevada), G2
Astragalus robbinsii var occidentalis		C2, S2(Nevada), G5T2
Gutierrezia petradoria		C2, S2(Utah), G2
Haplopappus crispus		C2, S2(Utah), G2
Penstemon tidestromii		C2, S2(Utah), G2
Penstemon wardii		C2, S2(Utah), G2
Cuscuta warneri		C2, SH(Utah), GH
Eriogonum argophyllum		LE***, CE S1(Nevada), G1
Castilleja salsuginosa		LE***, CE(Nevada), G1Q

*Source: Internet: ~hafb Note that "within UTTR", "buffer zone" and "near UTTR" were not specifically defined when used by this source; nonetheless sites and site–specific records should be evaluated for all species in this table whenever substantive ground-disturbing activities are planned in the interest of good ecological stewardship, and for the threatened or endangered species in this list because of the legal protection mandated by that status.

Internet: statl-r6.html

**Rankings are federal, state, and Natural Heritage Program, respectively; see Table 3.4-5. Note that candidate categories are no longer used by USFWS, although they provide useful information about the species that were formerly assigned to them.

***Not listed as endangered by U.S. Fish and Wildlife Service

[1] Ute ladies'–tresses has been documented in the vicinity of Callao (Blood 1999). It is thus within the Cruise Missile Study Area (CMSA).

Table 3.4-4 Animal Species of Concern for UTTR as Listed by Utah State University (USU) and Others as Annotated[*1]

Common Name	Scientific Name	Current Threatened & Endangered Status[2]	Status per Cited Sources[3]
Mammals[4, 5]			
Utah prairie dog[6]	***Cynomys parvidens***	**LT, ST**	LT, ST
Abert squirrel	*Sciurus aberti*	SOSC	SL
Belding ground squirrel	*Spermophilis beldingi*	SOSC	SL
Cactus mouse	*Peromyscus eremicus*	SOSC	SL
Canada lynx	*Lynx canadensis*	PT, SOSC–P	C(w)
Desert shrew	*Notiosorex crawfordi*	SOSC	SL
Dwarf shrew	*Sorex nanus*	SOSC	SL
Merriam's kangaroo rat	*Dipodomys merriami*	SOSC	SL
Ringtail cat[7, 8, 9, 10]	*Bassariscus astutus*	SOSC	SD
Rock pocket mouse	*Perognathus intermedius*	SOSC	SL
Southern grasshopper mouse	*Onychomys torridus*	SOSC	SL
Spotted ground squirrel	*Spermophilis spilosoma*	SOSC	SL
Thirteen-lined ground squirrel	*Spermophilis tridecemlineatus*	SOSC	SL
Yellow pine chipmunk	*Eutamias amoenus*	SOSC	SL
Big free-tailed bat	*Tadarida macrotis*	SOSC–P	SL
Brazilian free–tailed bat [7, 8, 10]	*Tadarida brasiliensis*	SOSC–P	SP/SD
Desert kangaroo rat	*Dipodomys deserti*	SOSC–P	SL
Mexican meadowmouse	*Microtus mexicanus*	SOSC–P	SL
Spotted bat	*Euderma maculatum*	SOSC–P	SL
Stephen's woodrat	*Neotoma stephansi*	SOSC–P	SL
Fisher	*Martes pennanti*	X	X

[*] For all species listed here by USU please note the footnotes carefully as the distribution of some species given by other citations may be more precise and may not include the Cruise Missile Study Area. Only the bolded species are legally protected.

Common Name	Scientific Name	Current Threatened & Endangered Status[2]	Status per Cited Sources[3]
Grizzly bear[11]	*Ursus horribilis*	X	X
Botta's pocket gopher [8, 10]	*Thomomys bottae*		
Kit fox [7, 10]	*Vulpes macrotis nevadensis*		
Mexican big-eared bat	*Plecotis phyllotas*		SL
Northern pocket gopher [8, 10]	*Thomomys talpoides*		
Red bat	*Lasiurus borealis*		SL
Richardson's ground squirrel	*Spermophilis richardsoni*		SL
River otter	*Lutra canadensis*		SL
Rock mouse	*Peromyscus difficilis*		SL
Small–footed myotis [8, 10]	*Myotis ciliolabrum*		SD
Wyoming pocket mouse	*Perognathus fasciatus*		SL
Birds (All bird species in Utah are protected)[12]			
Southwestern willow flycatcher [10, 13]	***Empidonax traillii***	**LE, SE**	LE, SE
Peregrine falcon [8, 10, 14, 15]	*Falco peregrinus*	LE,SE but delisted on Aug.25'99	LE, SE
Whooping crane[16]	***Grus americana***	**LE**	LE
Mexican spotted owl [14, 17]	***Strix occidentalis***	**LT, ST**	LT, ST
Bald eagle [14, 18, 19]	*Haliaeetus leucocephalus*	LT, ST but proposed on Aug.11'99 for delisting	LT, ST
Ferruginous hawk [8, 10, 14, 20]	***Buteo regalis***	**ST**	ST, HFI
Yellow-billed cuckoo[21]	***Coccyzus americanus***	**ST**	ST
Mountain plover[22]	***Charadrius montanus***	**C, SOSC–P**	C2
California condor[23]	Gymnogyps californicus	LE, SOSC	X
Osprey [7, 8, 10, 14]	*Pandion haliaetus*	SOSC	SD, HFI
White pelican [8, 10, 14]	*Pelecanus erythrorhynchos*	SOSC	SD, SL
Williamson's sapsucker	*Sphyrapicus thyroikeus*	SOSC	HFI
Bell's vireo	*Vireo bellii*	SOSC–P	SL
Black swift	*Cypseloides niger*	SOSC–P	HFI
Black tern [10]	*Chlidonias niger*	SOSC–P	SP
Burrowing owl [8, 10, 14]	*Athene cunicularia*	SOSC–P	SP, HFI
Caspian tern [14]	*Hydropronge caspis*	SOSC–P	SL

Common Name	**Scientific Name**	**Current Threatened & Endangered Status[2]**	**Status per Cited Sources[3]**
Common yellowthroat [8, 10]	*Geothlypis trichas*	SOSC–P	SP
Grasshopper sparrow	*Ammodramus savannarum*	SOSC–P	SL
Lewis' woodpecker [8, 10, 14]	*Ansyndesmus lewis*	SOSC–P	SP/SD, HFI
Long-billed curlew [8, 10, 14]	*Numenius americanus*	SOSC–P	SP/SD, HFI
Sage grouse [10]	*Centrocercus urophas*	SOSC–P	SP/SD
Short–eared owl [8, 10]	*Asio flammeus*	SOSC–P	SP
Swainson's hawk [8, 10]	*Buteo swainsoni*	SOSC–P	SP
American bittern [7]	*Botaurus lentiginosus*		SQ
Band-tailed pigeon	*Columba fasciata*		HFI
Black-crowned night heron [7, 14]	*Nycticorax nycticorax*		SQ
Cooper's hawk [14]	*Accipiter cooperi*		HFI
Double-breasted cormorant [14]	*Phalacrocorax auritus*		SL
Flammulated owl [14]	*Otus flammeolus*		HFI
Fox sparrow	*Passerella iliaca*		SQ
Golden eagle [14, 19]	*Aquila chrysaetos*		HFI
Grace's warbler	*Dendroica graciae*		HFI
Great blue heron [14]	*Ardea herodias*		HFI, SQ
Loggerhead shrike [8, 10]	*Lanius ludovicianus*		
Merlin [14]	*Falco columbarius*		HFI
Mountain bluebird [14]	*Sialia currucoides*		SQ
Pileated woodpecker	*Dendrocopus pileatus*		HFI, SQ
Prairie falcon [14]	*Falco mexicanus*		HFI
Purple martin	*Pronge subis*		SL
Roadrunner	*Geococcyx californianus*		SL
Sandhill crane [7, 14]	*Grus canadensis*		HFI
Scott's oriole	*Icterus perisorum*		HFI
Snowy plover [7, 8, 10]	*Charadrius alexandrinus*		SD
Western bluebird [8, 10, 14]	*Sialia mexicana*		SD, HFI
Western grebe [14]	*Aechmorphorus occidentalis*		SQ
Yellow-breasted chat [10, 14]	*Icteria virens*		SP
Reptiles and Amphibians (All reptiles and amphibians are protected)			
Desert tortoise[24]	**Gopherus agassizi**	**LT, SE**	LT, SE

Common Name	Scientific Name	Current Threatened & Endangered Status[2]	Status per Cited Sources[3]
Gila monster[25]	***Heloderma suspectus***	**SE**	SL, SE
Columbia spotted frog[26]	**Rana luteiventris**	**CS**	C(w)3 (Wasatch Front) C(w)6 (West Desert)
Arizona lyre snake	Trimorpodon lamda	SOSC	SL
California kingsnake	Lampropeltis getulus californiae	SOSC	SL
Desert glossy snake	Arizona elegans	SOSC	SL
Desert iguana	Dipsosaurus dorsalis	SOSC	SL
Desert night lizard	Xantusia vigilis	SOSC	SL
Mojave patched-nosed snake	Salvadora hexalepis mojavensis	SOSC	SL
Mojave rattlesnake	Crotalus scutulatus scutulatus	SOSC	SL
Sidewinder rattlesnake	Crotalus cerastes cerastes	SOSC	SL
Speckled rattlesnake	Crotalus mitchelli pyrrhus	SOSC	SL
Utah blind snake	Leptotyphlops humilis utahensis	SOSC	SL
Western banded gecko	Coleonyx variegatus utahensis	SOSC	SL
Zebra-tailed lizard	*Callisaurus draconoides*	SOSC	SL
Arizona toad	Bufo microscaphous	SOSC–P	SL
Chuckwalla	Sauromalus obesus	SOSC–P	SL
Great Plains rat snake	*Elaphe guttata emoryi*	SOSC–P	SQ
Many-lined skink	Eumeces multivirgatus	SOSC–P	SL
Plateau whiptail	Cnemidophorus velox	SOSC–P	SL
Utah milk snake	*Lampropeltis triangulum*	SOSC–P	SQ
Utah mountain kingsnake	*Lampropeltis pyromelena*	SOSC–P	SQ
Pacific tree frog	Hyla regilla	X	SL
Relict leopard frog	Rana onca	X	SL
Utah black-headed snake	Tantilla planiceps utahensis		SL
Western smooth green snake	*Opheodrys vernalis blanchardi*		SQ
Western spotted frog	*Rana pretiosa pretiosa*		SQ
Fish			
Bonytail chub[27]	***Gila elegans***	**LE, SE**	LE
Colorado squawfish[28]	***Ptychocheilus lucius***	**LE, SE**	LE
Humpback chub[29]	***Gila cypha***	**LE, SE**	LE

Common Name	Scientific Name	Current Threatened & Endangered Status[2]	Status per Cited Sources[3]
June sucker[30]	***Chasmistes liorus mictus***	**LE, SE**	LE, ST
Razorback sucker[31]	***Xyrauchen texanus***	**LE, SE**	LE, ST
Virgin River bonytail chub[32]	***Gila robusta seminuda***	**LE, SE**	LE, ST
Woundfin[33]	***Plegopterus argentissimus***	**LE, SE**	LE
Lahontan cutthroat trout[34]	***Salmo clarki henhawi***	**LT, ST**	LT
Least chub [7, 35]	***Iotichthys phlegethontis***	**C, CS**	PE1, SD
Virgin River spinedace[36]	***Lopidomeda mollispinus***	**CS**	SD
Bonneville cutthroat trout[37]	***Oncorhynchus clarki utah***	**CS**	not listed
Leatherside chub	*Gila copei*	SOSC–P	SQ
Longnose dace	*Rhinichtys cataractae*		SQ
Invertebrates			
Kanab ambersnail	***Oxyloma haydeni***	**LE, SE**	LE
Utah valvata snail	***Valvata utahensis***	**LE, SE**	LE
Ogden Deseret Mountainsnail	*Oreohelix peripherica*	C, SOSC	C9
Bonneville pondsnail	*Stagnicola bonnevillensis*	SOSC–P	C2
Coral Pink Sand Dunes tiger beetle	*Cicindela limbata*		C3
Great Basin silverspot butterfly	*Speyeria nokomis nokomis*		SL

[1] U.S. Department of the Air Force, n.d., Internet: statl-r6.html, and Federal Register 1997, unless otherwise noted.

[2] Current status based on Division of Endangered Species Staff (1999) for Federal threatened and endangered species (Endangered, LE; Threatened, LT); on Federal Register (1999c) for Federal candidate species (Proposed Threatened, PT; Proposed Endangered, PE; Candidate, C); on Messmer et al. (1998) and Utah Division of Wildlife Resources (1998) for State of Utah species of concern (Endangered, SE; Threatened, ST; Species of Concern, SSOC; Species of Concern due to population decline, SSOC–P; and Conservation Species, CS); on Federal Register (1999a) for peregrine falcon status, and on Federal Register (1999b) for bald eagle status, with additional information on the Mexican spotted owl provided by Anonymous (1998).

[3] See Table 3.4-5 for Rankings or List Below

SP	=	State Protected (rank not provided)
SD	=	State Declining
SQ	=	Utah Status Questioned
HFI	=	High Federal Interest
SL	=	State Limited.

[4] Note that the black footed ferret, which is listed as federally and state endangered, probably still occurs in Utah. However, even the probable black-footed ferret historical range given by Messmer et al. (1998) does not include the Cruise Missile Study Area (CMSA), nor do any of the relatively recent probable sightings discussed by the Utah Division of Wildlife Resources (1998). Further, there is no likely habitat for the black-footed ferret within the CMSA (Edwards et al. 1995, Oliver 2000). This species is, therefore, not included in the list above.

[5] Note that the wolverine, which is listed as state threatened, probably still occurs in Utah. None of the relatively recent probable records of wolverine noted by the Utah Division of Wildlife Resources (1998) are within the CMSA and this reference notes that former populations, believed to be in Box Elder and Millard Counties, are now presumed extirpated. While the Deep Creek Mountains appear to provide appropriate habitat, they are too isolated for recruitment to occur reasonably (Oliver 2000). This species is therefore not included in the list above.

[6] Note that the present distribution of the West Desert population of the Utah prairie dog given by Messmer et at. (1998) is closest to the CMSA in southern Beaver County. The Division of Wildlife Resources (1998) lists this species as of confident presence in Beaver County and presumed extirpated in Millard County, where it formerly occurred. However, a colony has recently been located in Millard County, west of SH 257 near Bloom (Oliver 2000, Bonebrake 2000), and another previously unknown colony has recently been identified in Sanpete County near Gunnison (Oliver 2000, Sakaguchi 2000). Potential habitat for this species does exist within the CMSA (Edwards et al. 1995, Oliver 2000). Thus, although presently known populations do not occur in the CMSA, it is remotely possible that this species does occur there or might disperse into areas of suitable habitat within the CMSA (Oliver 2000). Therefore, it has been retained in the list above.

[7] Banta 1998a—snowy plover found on South Range–Air Force and South Range–Army breeding bird and migrant; osprey found at Fish Springs NWR as uncommon spring and fall migrant; sandhill cranes, black-crowned night herons, and American bitterns breed within UTTR; also least chub, small–footed myotis, Brazilian free–tailed bat, kit fox, and ringtail cat have been found on or adjacent to Fish Spring NWR.

[8] Blood 1998—the following species have been documented : small–footed myotis–Grassy Mountain; Brazilian free–tailed bat, Botta's pocket gopher, and northern pocket gopher–UTTR; ringtail–Newfoundland Mountains; peregrine falcon and snowy plover–Craner's Target Complex; snowy plover, common yellowthroat, and long-billed curlew–Blue Lake; ferruginous hawk and Lewis' woodpecker–Wildcat Mountain; ferruginous hawk, Swainson's hawk, burrowing owl, short–eared owl, long–billed curlew, and loggerhead shrike–beneath the Military Operating Area; Lewis' woodpecker–Gold Hill; white pelican–Saltair; osprey–Stockton; loggerhead shrike–North Range; western bluebird–Fish Springs NWR.

[9] Banta 1998

[10] Blood 1998

[11] Note that the historic distribution of the grizzly bear given by Messmer et al. (1998) once (in 1850) included the CMSA but by 1920 its closest populations were in Iron County, south of the CMSA. Further, the probable historical range of the gray wolf given by Messmer et al. (1998) once included all of the CMSA, although the Utah Division of Wildlife Resources (1998) mentions a specimen only from Box Elder County within the CMSA. Neither of these species now occurs in the CMSA.

[12] Note that all migratory bird species are protected under the Migratory Bird Treaty Act.

[13] Note that the closest current Willow Flycatcher populations closest to the CMSA are in Piute County (Messmer et al. 1998) and/or Garfield County (Utah Division of Wildlife Resources 1998). This species is not documented within the CMSA by these sources.

[14] Noted by Workman et al. (1992) as occurring on or near the North Range and South Range–Air Force.

[15] Note that the current Peregrine Falcon distribution given by Messmer et al. (1998) includes a small portion of the North Range, while the historic distrubution also includes western Box Elder and Tooele Counties within the CMSA. The Utah Division of Wildlife Resources (1998) lists this species as possible within all of the CMSA counties and previously well documented in Box Elder and Tooele Counties. Other sources have documented this species within the CMSA (Section 3.4.3).

[16] The Utah Division of Wildlife Resources (1998) notes that a few individual Whooping Cranes are transient between Idaho and New Mexico (1 to all 4 of the individuals cross-fostered to Sandhill Cranes in Idaho) and may occasionally summer in Weber or, especially, Uintah Counties. This source notes no observations west of Great Salt Lake.

[17] Note that the Mexican Spotted Owl distribution given by Messmer et al (1998) and the Utah Division of Wildlife Resources comes closest to the CMSA in Iron County, while the distribution given by Anonymous (1998) for the Colorado Plateau appears to slightly overlap the southeastern boundary of the CMSA. Therefore, while the species has not been documented in the CMSA, it could occur there.

[18] Note that even the historic Bald Eagle distribution given by Messmer et al. (1998) lies barely to the east of the CMSA, while the Utah Division of Wildlife Resources (1998) notes it is presumed extirpated in Tooele County. Nonetheless, the species has been documented within the CMSA (See Section 3.4.3).

[19] Note that the Bald Eagle and Golden Eagle are also protected under the Bald and Golden Eagle Protection Act.

[20] The Utah Division of Wildlife Resources (1998) notes the probable presence of the ferruginous hawk in Box Elder, Juab, Millard, and Beaver Counties. It has been documented to breed in numerous places within the CMSA (See Section 3.4.3).

[21] The Utah Division of Wildlife Resources (1998) notes documented breeding of the yellow-billed cuckoo to the east of the CMSA in Weber, Salt Lake, and Utah Counties and to the south in Washington County. Given the habitat preferences of this species is it a potential breeding species in the CMSA.

[22] The Utah Division of Wildlife Resources (1998) notes that the only documentation of mountain plover breeding in Utah is in Duchesne County, but that the species is little known and studied. Given the habitat preferences of this species is it a potential breeding species in the CMSA.

[23] The Utah Division of Wildlife Resources (1998) notes an observation of this species in Beaver County in the early 1870s, with the species subsequently presumed extirpated; two recent (1996 and 1997) multiple introductions of captive-raised birds in northern Arizona may result in occasional California condors in southern Utah, perhaps even so far north as the CMSA. While this species is Federally endangered, the released birds are categorized as "“experimental, non essential”.

[24] Note that the desert tortoise capture locations given by Messmer et al. (1998) are all within Washington County and outside the CMSA.

[25] The Utah Division of Wildlife Resources (1998) documents the Gila monster only in Washington County, far outside the CMSA for a species of relatively low mobility.

[26] The Utah Division of Wildlife Resources (1998) notes documentation of the Columbia spotted frog in at least 11 locations in the West Desert (Tooele County—vicinity of Ibapah, Juab County—Snake Valley, and Millard County—Snake Valley and Tule Valley). It thus occurs widely within the CMSA. This source provides no details about the conservation agreements under which the species is being managed.

[27] Note that the boneytail chub capture locations given by Messmer et al. (1998) are in the Virgin River and Colorado River drainages and outside the CMSA. The counties included in the distribution of this species by the Utah Division of Wildlife Resources (1998) correspond with these drainages.

[28] Note that the Colorado squawfish capture locations given by Messmer et al. (1998) are in the Green, Colorado, and San Juan Rivers. The counties included in the distribution of this species by the Utah Division of Wildlife Resources (1998) correspond with these drainages.

[29] Note that the humpback chub capture locations given by Messmer et al. (1998) are in the Green and Colorado River drainages and outside the CMSA. The counties included in the distribution of this species by the Utah Division of Wildlife Resources (1998) correspond with these drainages.

[30] Note that the June sucker capture locations given by Messmer et al. (1998) are in Utah Lake and outside the CMSA. The Utah Division of Wildlife Resources (1998) also notes an artifically created population in CampCreek Reservoir, Box Elder County, which in within the CMSA.

[31] Note that the razorback sucker capture locations given by Messmer et al. (1998) are in the Green and Colorado River drainages and outside the CMSA. The counties included in the distribution of this species by the Utah Division of Wildlife Resources (1998) correspond with these drainages.

[32] Note that the Virgin River bonytail chub distribution given by Messmer et al. (1998) are in the Virgin River drainage and outside the CMSA. The county included in the distribution of this species by the Utah Division of Wildlife Resources (1998) corresponds with this drainage.

[33] Note that the woundfin capture locations given by Messmer et al. (1998) are in the Virgin River drainage and outside the CMSA. The county included in the distribution of this species by the Utah Division of Wildlife Resources (1998) corresponds with this drainage.

[34] The Utah Division of Wildlife Resources (1998) documents the Lahontan cutthroat trout in Box Elder County, in two streams in the Pilot Range. These individuals may represent the only surviving genetically pure population of this race.

[35] The Utah Division of Wildlife Resources (1998) documents the least chub in four to seven locations: two to five locations in the Snake Valley area of the West Desert (Western Millard and Juab Counties) and two in eastern Juab County. Only one (at Fish Springs National Wildlife Refuge, Juab County) of the five introductions documented were successful. This source provides no details about the conservation agreements under which the species is being managed.

[36] The Utah Division of Wildlife Resources (1998) documents the Virgin River spinedace only in Washington County, outside the CMSA.

[37] The Utah Division of Wildlife Resources (1998) notes that the Bonneville cutthroat trout is well documented in Juab County—several streams in the Deep Creek Mountains, and in Beaver County. It thus occurs within the CMSA. This source provides no details about the conservation agreements under which the species is being managed.

Table 3.4-5 Key to Status of Species of Concern

Federal Status Categories		**State Natural Heritage Program Status (for both Utah and Nevada)**	
LE	Listed Endangered–in danger of extinction in all or significant portions of their ranges.	G	Global rank indicator, based on worldwide distribution as the species level.
LT	Listed Threatened–likely to be classified as Endangered in the foreseeable future if present trends continue.	T	Trinomial rank indicator, based on worldwide distribution at the infraspecific level.
PE	Proposed Endangered. (priorities may be listed here on the basis of immediacy and magnitude of threats as well as taxonomic status, with one being the highest status).	S	State rank indicator, based on distribution at the lowest taxonomic level.
PT	Proposed Threatened.		Indicator Modifiers
C1	Category 1 Candidate–enough substantial information is on file to support listing as Threatened or Endangered.	1	Critically imperiled due to extreme rarity, imminent threats, or biological factors.
C2	Category 2 Candidate–there is some evidence of vulnerability, but without enough data to support listing as Threatened or Endangered. Further research is needed.	2	Imperiled due to rarity or other demonstrable factors.
1*, 2*	Candidates now possibly extinct.	3	Rare and local throughout its range, or with very restricted range, or otherwise vulnerable to extinction.
C3	Category 3–once considered for listing as Threatened or Endangered, but no longer under consideration.	4	Apparently secure, though frequently quite rare in parts of its range, especially at its periphery.
3A	Taxa for which there is persuasive evidence of extinction.	5	Demonstrably secure, though frequently quite rare in parts of its range, especially at its periphery.
3B	Names now considered to represent distinct taxa.	E	Exotic or introduced.
3C	Taxa proven to be more abundant or widespread, or less vulnerable, than previously thought.	U	Unknown.
C4–C11	Progressively lower priority as category candidates.	H	Of historical occurrence, not now known but could be rediscovered.
>	Last known status; not listed in most recent Federal Register.	X	Believed extinct or extirpated.
--	No past or present federal status.	Q	Taxonomic status uncertain.
C(w)	Denotes taxa for which a "warranted but precluded" 12-month petition finding has been recycled.	?	Assigned rank uncertain.

	Utah State Status		Nevada State Status
	Endangered–Any wildlife species, subspecies, or population which is threatened with extirpation from Utah or extinction resulting from very low or declining numbers, alteration and/or reduction of habitat, detrimental environmental changes, or any combination of the above.		Critically Endangered–taxa threatened with extinction, whose survival requires assistance because of overexploitation, disease or other factors or because their habitat is threatened with destruction, drastic modification, or severe curtailment.
	Threatened–Any wildlife species, subspecies, or population which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range in Utah or the world.	CE#	Recommended for listing as critically endangered, pending formal listing.
		CY	Protected as Cactus, Yucca, or Christmas Tree under NRS 527.060-.120.

Source: Internet: ~hafb

*Note: Species not yet listed by USFWS as Threatened or Endangered are currently categorized as Proposed Threatened, Proposed Endangered, and Candidate (50 CFR 17:57534-57547; October 25, 1999); candidate subcategories are no longer used as legal designations, although they provide useful information about the species to which they were formerly assigned.

Table 4.0-1 Types of UTTR Uses and Their Associated Environmental Disturbances

Range Uses	Air	Ground Surface	Ground Subsurface	Debris[1] (Chemical, Metal, and Other)
Training				
Air to Ground				
Strike[1]	Aircraft exhaust Noise	Bomb impact Fire	Bomb impact	Bombs
CFT[1]	Bombing dust Strafing dust Noise	Strafing munitions impact Fire	Strafing munitions impact	Bomb debris Strafing munition debris
Air to Air				
Intercept[1]	Aircraft exhaust Noise			
LowatAct/Dact[1]	Aircraft exhaust Noise			
Ground Troops	Ground vehicle exhaust Target maintenance dust	Off-road vehicle (ORV) use		POL leaks
Testing	Aircraft exhaust Ground vehicle exhaust Bombing dust Strafing dust Target maintenance dust Noise	Bomb impact Strafing munitions impact ORV use Fire	Bomb impact Strafing munitions impact	Bombs Bomb debris Strafing munition debris POL leaks
Support Services	Ground vehicle exhaust ORV dust	Earth moving	Earth moving	POL leaks

1 Chemical, metal, or other debris may be left on or below the ground surface.

Table 4.0-2 Specific Environmental Resources Associated with Types of Environmental Disturbances

Specific Environmental Resource	Air	Ground Surface	Ground Subsurface	Debris1
Climatology	-	-	-	-
Geomorphology (caves)		X	X	
Mineral Resources		X	X	
Soils	X[2]	X	X	X
Surface Water		X		X
Ground Water			X	X
Aquatic Flora		X		X
Wetlands		X		X
Terrestrial Flora	X	X		X
Terrestrial Fauna	X	X		X
Threatened and Endangered Species	X	X		X
Archeological/Paleontological Resources	X	X	X	
Historical Resources	X	X		X
Visual Resources	X	X		X
Air Quality	X	X		
Noise	X	X	X	

[1] Chemical, metal, or other debris may be left on or below the ground surface.

[2] Acid fallout.

APPENDIX B

CARRIER AIRCRAFT AND MISSILES TO BE TESTED

APPENDIX B – CARRIER AIRCRAFT AND MISSILES TO BE TESTED

(Note: All information in this section drawn from official and unofficial UNCLASSIFIED sources)

B-52 Stratofortress

Air Combat Command's B-52 is a long-range, heavy bomber that can perform a variety of missions. The bomber is capable of flying at high subsonic speeds at altitudes up to 50,000 feet (15,166.6 meters). It can carry nuclear or conventional ordnance with worldwide precision navigation capability.

In a conventional conflict, the B-52 can perform air interdiction, offensive counter-air and maritime operations. During Desert Storm, B-52s delivered 40 percent of all the weapons dropped by coalition forces. It is highly effective when used for ocean surveillance, and can assist the U.S. Navy in anti-ship and mine-laying operations. Two B-52s, in two hours, can monitor 140,000 square miles (364,000 square kilometers) of ocean surface.

All B-52s are equipped with an electro-optical viewing system that uses platinum silicide forward-looking infrared and high resolution low-light-level television sensors to augment the targeting, battle assessment, flight safety and terrain-avoidance system, thus further improving its combat ability and low-level flight capability.

Pilots wear night vision goggles (NVGs) to enhance their night visual, low-level terrain-following operations. Night vision goggles provide greater safety during night operations by increasing the pilot's ability to visually clear terrain and avoid enemy radar.

Starting in 1989, an on-going modification incorporates the global positioning system, heavy stores adaptor beams for carrying 2,000 pound munitions and additional smart weapons capability. All aircraft are being modified to carry the AGM-142 Raptor missile and AGM-84 Harpoon anti-ship missile.

The use of aerial refueling gives the B-52 a range limited only by crew endurance. It has an unrefueled combat range in excess of 8,800 miles (14,080 kilometers).

The aircraft's flexibility was evident during the Vietnam War and, again, in Operation Desert Storm. B-52s struck wide-area troop concentrations, fixed installations and bunkers, and decimated the morale of Iraq's Republican Guard. The Gulf War involved the longest strike mission in the history of aerial warfare when B-52s took off from Barksdale Air Force Base, La., launched conventional air launched CMs and returned to Barksdale -- a 35-hour, non-stop combat mission.

Background

For more than 35 years B-52 Stratofortresses have been the primary manned strategic bomber force for the United States. The B-52 is capable of dropping or launching a significant array of weapons in the U.S. inventory. This includes gravity bombs, cluster bombs and precision guided missiles. Updated with modern technology, the B-52 will continue into the 21st century as an important element of our nation's defenses. Current engineering analysis shows the B-52's life span to extend beyond the year 2045.

The B-52A first flew in 1954, and the B model entered service in 1955. A total of 744 B-52s were built with the last, a B-52H, delivered in October 1962. Only the H model is still in the Air Force inventory and all are assigned to Air Combat Command.

The first of 102 B-52H's was delivered to Strategic Air Command in May 1961. The H model can carry up to 20 air launched CMs. In addition, it can carry the conventional CM which was launched from B-52G models during Desert Storm.

The B-52's electronic countermeasures suite is capable of protecting itself against a full range of air defense threat systems by using a combination of electronic detection, jamming and infrared countermeasures. The B-52 can also detect and counter missiles engaging the aircraft from the rear. These systems are undergoing continuous improvement in order to enable them to continue to counter emerging threat systems. (Internet: US Air Force Fact Sheet, US Air Force Museum, Fellowship of American Scientists)

General Characteristics

Primary Function: Heavy bomber

Contractor: Boeing Military Airplane Co.

Power Plant: Eight Pratt & Whitney engines TF33-P-3/103 turbofan

Thrust: Each engine up to 17,000 pounds

Length: 159 feet, 4 inches (48.5 meters)

Height: 40 feet, 8 inches (12.4 meters)

Wingspan: 185 feet (56.4 meters)

Speed: 650 miles per hour (Mach 0.86)

Ceiling: 50,000 feet (15,151.5 meters)

Weight: Approximately 185,000 pounds empty (83,250 kilograms)

Maximum Takeoff Weight: 488,000 pounds (219,600 kilograms)

Range: Unrefueled 8,800 miles (7,652 nautical miles)

Armament: Approximately 70,000 pounds (31,500 kilograms) mixed ordnance -- bombs, mines and missiles. (Modified to carry air-launched CMs, Harpoon anti-ship and Have Nap missiles.)

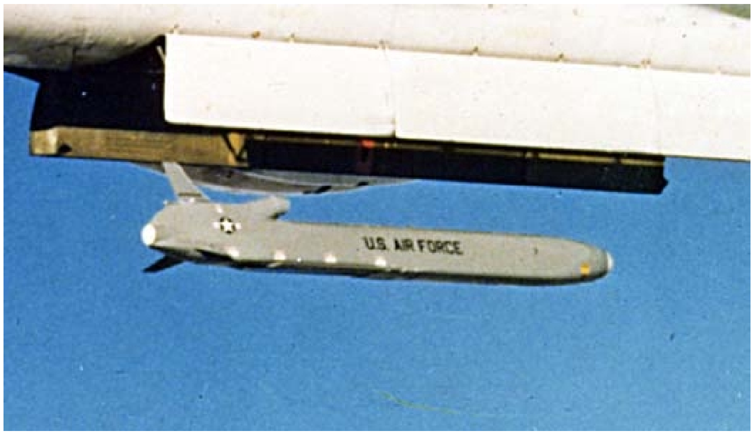
Crew: Five (aircraft commander, pilot, radar navigator, navigator and electronic warfare officer)

Accommodations: Six ejection seats

Unit Cost: $30 million

Date Deployed: February 1955 (current model produced 1960-1962)

Inventory: Active force, 85; ANG, 0; Reserve, 9



AGM-86

Two versions of this missile are in service. The AGM-86B is a strategic nuclear weapon, which can be equipped with a 200 kiloton warhead. Production of the initial 225 AGM-86B missiles began in fiscal year 1980 and production of a total 1,715 missiles was completed in October 1986. The air-launched CM had become operational four years earlier, in December 1982.

Subsequently, in 1986, the AGM-86C Conventional Air Launched CM (CALCM) was developed. This missile was converted from the AGM-86B. It is fitted with a conventional high explosive warhead. The AGM 86C uses an onboard GPS coupled with its inertial navigation system (INS).

The CALCM became operational in January 1991 at the onset of Operation Desert Storm. Seven B-52s, from Barksdale AFB, La., launched 35 missiles at designated launch points in the U. S. Central Command's area of responsibility to attack high-priority targets in Iraq.

In 1996 and 1997, 200 additional CALCMs were produced from excess ALCMs. These missiles, designated Block I, incorporate improvements such as a larger and improved conventional payload (3,000 pound blast class), a multi-channel GPS receiver and integration of the buffer box into the GPS receiver. The upgraded avionics package was retrofitted into all existing CALCM (Block 0) so all AGM-86C missiles are electronically identical. (Internet: US Air Force Fact Sheet, US Air Force Museum, Fellowship of American Scientists, Lennox, 1996)

AGM-86 General Characteristics

Primary Function: Air-to-ground strategic CM

Contractor: Boeing Defense and Space Group.

Guidance Contractors: Litton Guidance and Control, and Interstate Electronics Corp. (AGM-86C model)

Power Plant: Williams Research Corp. F-107-WR-10 turbofan engine

Thrust: 600 pounds

Length: 20 feet, 9 inches (6.3 meters)

Weight: 3,150 pounds (1,429 kilograms)

Diameter: 24.5 inches (62.23 centimeters)

Wingspan: 12 feet (3.65 meters)

Range: AGM-86B: 1,500-plus miles; AGM-86C: 600 nautical miles (nominal); classified (specific)

Speed: AGM-86B, about 550 mph (Mach 0.73); AGM 86C, high subsonic (nominal), classified (specific)

Guidance System: AGM-86B, Litton inertial navigation element with terrain contour-matching updates; AGM 86C, Litton INS element integrated with multi-channel onboard GPS

Warheads: AGM-86B, Nuclear capable; AGM-86C; Block 0, 2,000 pound class, and
Block I, 3,000 pound class

AGM-129 Advanced Cruise Missile (ACM)

The ACM is an air-to-ground CM developed to provide the Strategic Air Command (now Air Combat Command) with a long range, highly survivable, strategic standoff weapon. The ACM uses laser sensor updates to give it high navigation accuracy and "stealth" technology to give it a low radar cross section and increased chance to penetrate enemy defenses. The distinctive forward swept wing is an example of the application of stealth technology. Up to 12 ACMs can be carried by a B-52H bomber. The B-2 bomber can also carry the ACM. Full-scale development of the ACM began in 1983, and the first production missile was delivered in 1987.

Specifications

Span: 10 ft. 3 in.

Length: 20 ft. 10 in.

Body diameter: 2 ft. 5 in.

Weight: More than 3,500 lbs. loaded

Warhead: W-80-1 (nuclear) warhead

Engine: Williams International F112 turbofan of 732 lbs. thrust

Performance

Cruising speed: subsonic

Range: over 1,500 statute miles/1,300 nautical miles

APPENDIX C
CONVENTIONAL ALCM PROCEDURES

APPENDIX C – CONVENTIONAL ALCM (CALCM) PROCEDURES

The CALCM was developed from the AGM-86B ALCM by substituting a conventional high explosive warhead for the W-80 nuclear device that was authorized for the AGM-86B. It is tested at the UTTR as a conventional weapon, that is, the warhead arms and detonates as it would in combat employment. Therefore the test procedures for the CALCM differ in some details from those used in other CM tests.

The most obvious difference and the reason for the additional restrictions is that the CALCM is tested with a live warhead. As noted in Appendix B, that warhead is in either the 2000 lb. (CALCM Block 0) or 3000 lb. (CALCM Block I) class. The warhead detonates at a planned target, cleared for that activity. A predesignated CALCM target is usually used (see Figure C-1).

The CALCM is launched and flown only in restricted airspace (other CMs can be flown in MOAs or on specially designated MTRs). This is because restricted airspace offers the degree of protection to non–participating aircraft that is appropriate for this activity, and permits the Air Force to conduct the test without the need for chase aircraft. Non-participating aircraft are excluded from restricted airspace during tests.

No chase aircraft follow the CALCM. However, other CM test support assets, such as the ARIA aircraft and extensive ground based surveillance and telemetry systems, are still used.

The CALCM flies a shorter mission on the range than other CMs. Note its nominal 600 mile range capability as compared to the 1500 mile range attributed to other CMs (see Appendix B).

APPENDIX D
CRUISE MISSILE TEST AVOIDANCE AREAS

APPENDIX D – CRUISE MISSILE TEST AVOIDANCE AREAS

Table D-1 lists sites underlying UTTR airspace that must be avoided by CMs and other unmanned aerial vehicles. The following map (Figure D-1) depicts each of these sites with a black triangle:

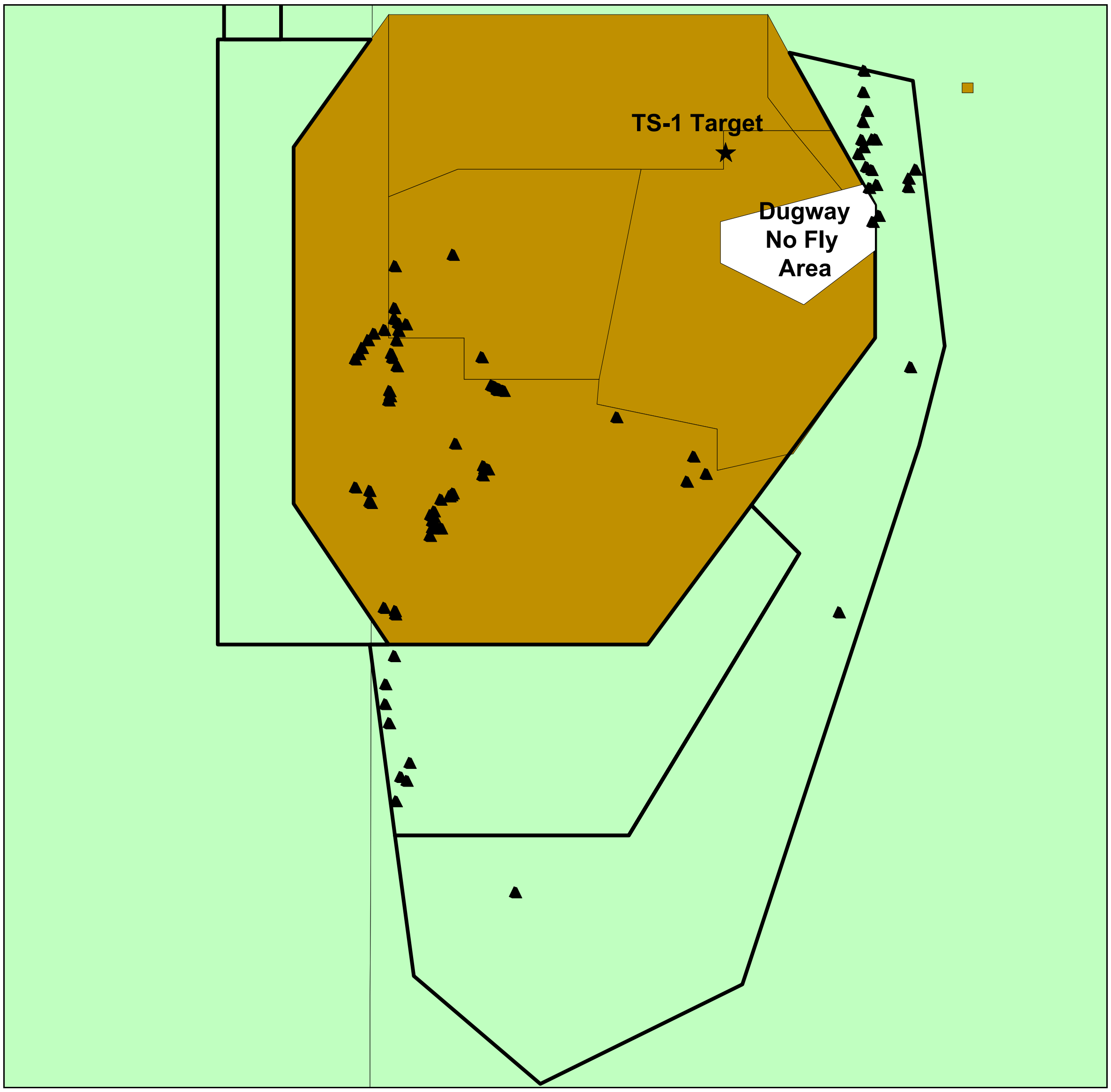
Table D-1. CM/UAV Avoidance Areas

LOCATION	LATITUDE	LONGITUDE
Keith Evans Ranch	40° 20' 35.2"	112° 44' 24.0"
Southeast of Evans Ranch	**40° 20' 11.6"**	**112° 43' 33.5"**
Tekoi gate (Note: center the circle 3/4 mile west of these coordinates)	40° 22' 08.6" (40° 22' 08.6")	112° 44' 48.4" (112° 45' 39.6")
Pony Express Gas Station	**40° 22' 59.0"**	**112° 44' 47.5"**
Bear residence	40° 23' 51.2"	112° 45' 10.3"
Reservation residences West end	**40° 23' 55.5"**	**112° 43' 28.1"**
Reservation residences East end	40° 23' 55.9"	112° 42' 56.2"
Island Ranch	**40° 27' 20.3"**	**112° 44' 16.9"**
Red Brick House	40° 29' 37.0"	112° 44' 52.6"
Iosepa	**40° 32' 13.0"**	**112° 44' 48.9"**
Andrus Ranch (Lincoln Hwy)	40° 18' 02.2"	112° 43' 56.9"
4 Houses (Lincoln Hwy)	**40° 18' 25.0"**	**112° 42' 48.1"**
White Ranch	40° 14' 42.2"	112° 42' 26.0"
LDS Church outside DPG Gate	**40° 13' 57.7"**	**112° 43' 23.0"**
New House/Old Foundation	40° 26' 00.6"	112° 44' 55.0"
Fish Springs Complex	**39° 50' 23.8"**	**113° 23' 55.5"**
Granite Ranch #1	39° 44' 06.6"	113° 44' 15.9"
Granite Ranch #2	**39° 44' 05.9"**	**113° 44' 50.5"**
Granite Ranch #3	39° 44' 30.4"	113° 45' 01.8"
Granite Ranch #4	**39° 43' 23.6"**	**113° 45' 05.8"**
1000 Peaks Ranch	39° 41' 12.4"	113° 49' 51.0"
Trout Creek #1	**39° 40' 51.5"**	**113° 50' 20.1"**
Trout Creek #2	39° 40' 27.7"	113° 51' 46.5"
Partoun #1	**39° 39' 02.8"**	**113° 52' 51.1"**
Partoun #2	39° 38' 23.0"	113° 52' 50.9"
Partoun #3	**39° 37' 51.9"**	**113° 53' 05.1"**
Partoun #4	39° 37' 21.0"	113° 52' 36.5"
Partoun #5	**39° 37' 11.6"**	**113° 52' 36.6"**

Partoun #6	39° 36’ 59.8”	113° 52’ 02.2”
Partoun #7	**39° 36’ 59.9”**	**113° 51’ 41.5”**
Partoun #8	39° 37’ 00.5”	113° 53’ 05.2”
West Desert Elementary	**39° 38’ 36.0”**	**113° 53’ 22.6”**
Partoun #9	39° 36’ 05.7”	113° 53’ 28.1”
Pleasant Valley #1	**39° 40’ 04.0”**	**114° 02’ 49.4”**
Pleasant Valley #2	39° 40’ 15.4”	114° 03’ 01.0”
Pleasant Valley #3	**39° 41’ 30.0”**	**114° 03’ 00.0”**
Pleasant Valley #4	39° 41’ 56.5”	114° 05’ 15.9”
Gandy #1 (Bates)	**39° 27’ 26.0”**	**114° 00’ 42.8”**
Gandy #2 (Warm Creek)	39° 27’ 00.6”	113° 58’ 58.7”
Gandy #3	**39° 26’ 37.4”**	**113° 58’ 57.4”**
Gandy #4	39° 21’ 35.2”	113° 59’ 08.1”
Sevier #1	**39° 18’ 11.3”**	**114° 00’ 30.3”**
Sevier #2	39° 15’ 46.7”	114° 00’ 32.1”
Sevier #3 (cluster of 3)	**39° 13’ 31.2”**	**113° 59’ 55.5”**
Trout Creek LDS Church	39° 41’ 01.0”	113° 50’ 04.6”
Douglass Ranch	**39° 47’ 12.1”**	**113° 49’ 28.2”**
Callao #1	39° 54’ 05.1”	113° 43’ 15.2”
Callao #2	**39° 54’ 05.1”**	**113° 43’ 15.2”**
Callao #3	39° 53’ 42.7”	113° 42’ 51.2”
Callao #4	**39° 53’ 51.8”**	**113° 42’ 40.2”**
Callao #5	39 ° 53’ 39.8”	113° 42’ 10.5”
Callao #6	**39° 53’ 34.6”**	**113° 41’ 47.3”**
Callao #7	39° 54’ 15.0”	113° 43’ 43.2”
Six Mile Ranch	**39° 57’ 38.1”**	**113° 45’ 15.3”**
Gold Hill	40° 09’ 59.1”	113° 49’ 50.1”
Ibapah #1	**40° 08’ 36.9”**	**113° 58’ 59.6”**
Ibapah #2	40° 03’ 33.5”	113° 59’ 03.9”
Ibapah School	**40° 02’ 15.1”**	**113° 59’ 07.6”**
Ibapah #3	40° 01’ 44.6”	113° 58’ 30.4”
Ibapah #4 (Lonestar)	**40° 01’ 37.7”**	**113° 57’ 15.2”**
Ibapah #5	40° 00’ 48.4”	113° 58’ 26.0”
Ibapah Airfield	**39° 59’ 40.3”**	**113° 58’ 43.9”**
Ibapah #7	39° 58’ 03.4”	113° 59’ 36.5”
Ibapah #8	**39° 57’ 34.4”**	**113° 59’ 23.0”**
Ibapah #9	39° 56’ 32.8”	113° 58’ 42.1”
Goshute #1	**39° 53’ 33.3”**	**113° 59’ 52.3”**

LOCATION	**LATITUDE**	**LONGITUDE**
Goshute #2	39° 52’ 57.0”	113° 59’ 47.1”
Goshute #3	**39° 52’ 25.3”**	**113° 59’ 59.7”**
Outback #1	39° 58’ 02.2”	114° 04’ 38.9”
Outback #2	**39° 57’ 22.9”**	**114° 05’ 17.8”**
Outback #3	39° 58’ 46.4”	114° 04’ 12.8”
Ibapah #10	**39° 59’ 42.4”**	**114° 03’ 17.2”**
Ibapah #11	40° 00’ 28.6”	114° 02’ 21.4”
Ibapah #12	**40° 00’ 54.7”**	**114° 00’ 41.3”**
Mine #1	39° 45’ 39.0”	113° 11’ 44.8”
Mine #2	**39° 42’ 37.6”**	**113° 12’ 47.8”**
Mine #3	39° 43’ 34.4”	113° 09’ 48.5”
Petra	**39° 08’ 41.5”**	**113° 56’ 39.5”**
Eskdale #1	39° 06’ 32.8”	113° 57’ 07.4”
Eskdale #2	**39° 04’ 05.2”**	**113° 58’ 50.8”**
Eskdale #3	39° 07’ 00.7”	113° 58’ 07.5”
Lone Truck	**38° 53’ 05.7”**	**113° 39’ 57.5”**
Delta Gravel Pit	39° 26’ 51.8”	112° 48’ 42.7”
Ranch #1	**39° 56’ 26.5”**	**112° 37’ 25.0”**
Tera #1	40° 18’ 09.1”	112° 37’ 46.9”
Tera #2	**40° 19’ 11.2”**	**112° 37’ 40.9”**
Willow Springs	40° 20’ 16.5”	112° 36’ 37.1”

Figure D-1. MAPINFO Depiction of overflight restrictions



Black triangles depict surveyed overflight restrictions; black star depicts TS-1 CALCM target

APPENDIX E
ACRONYMS

APPENDIX E – ACRONYMS LIST

ACM	Advanced Cruise Missile
AFI	Air Force Instruction
AFMC	Air Force Material Command
AGL	Above Ground Level
AGM	Air to Ground Missile
ALCM	Air Launched Cruise Missile
AMSL	Above Mean Sea Level
AUM	Animal Unit Month
BLM	Bureau of Land Management
CALCM	Conventional Air Launched Cruise Missile
CINC	Commander in Chief
CMMCA	Cruise Missile Mission Control Aircraft
CSEL	C–weighted sound exposure level
CSRL	Common Strategic Rotary Launcher
DPG	Dugway Proving Ground
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Directorate, Plans and Programs Division
FLPMA	Federal Land Policy and Management Act of 1976
FOT&E	Follow on Operational Test and Evaluation
FTS	Flight Termination System or Flight Test Squadron
GIS	Geographic Information System
GPS	Global Positioning System
HAFB	Hill Air Force Base
IAG	Interagency Agreement
ICBM	Intercontinental Ballistic Missile
IR	Instrument Route
LDS	Latter Day Saints
MCC	Mission Control Center
MOA	Military Operations Area
MRTFB	Major Range Test Facility Base

MTR	Military Training Route
n.d.	no date
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NRD	National Registry District
NRHP	National Register of Historic Places
NVG	Night Vision Goggle
NWR	National Wildlife Refuge
OOALC	Ogden Air Logistics Center (OO-ALC)
ORV	Off Road Vehicle
Psf	Pounds per Square Foot
RA	Restricted Area
RANS	Range Squadron
RCC	Remote Command and Control,
RCS	Range Control Squadron
SEL	Sound Equivalent Level
SOA	Supersonic Operating Area
STRATCOM	US Strategic Command
T&E	Threatened and Endangered
TERCOM	Terrain Contour Matching (navigation system)
TES	Test and Evaluation Squadron
UAV	Unmanned Aerial Vehicle
UDWR	Utah Division of Wildlife Resources
USDI	US Department of the Interior
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Service
USU	Utah State University
VFR	Visual Flight Rules
VRM	Visual Resource Management
WMD	Weapons of Mass Destruction
WSA	Wilderness Study Area
WSEP	Weapon System Evaluation Program